A

HISTORY

OF THE

EARTH,

AND

ANIMATED NATURE.

IN FOUR VOLUMES.

BY OLIVER GOLDSMITH.

A NEW EDITION.

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A HISTORY OF ANIMALS.

PART IV.

OF FISHES, *continued.*

BOOK IV.

OF CRUSTACEOUS AND TESTACEOUS FISHES.

CHAP. I.

THE DIVISION OF SHELL FISH.

IN deſcribing the inhabitants of the water, a claſs of animals occur, that mankind, from the place of their reſidence, have been content to call fiſh; but that naturaliſts, from their formation, have juſtly agreed to be unworthy of the name. Indeed, the affinity many of this kind bear to the inſect tribe, may very well plead for the hiſtorian who ranks them rather as inſects. However, the common language of a country muſt not be ſlightly invaded; the names of things may remain, if the philoſopher be careful to give preciſion to our ideas of them.

There are two claſſes of animals, therefore, inhabiting the water, which commonly receive the name of fiſhes, entirely different from thoſe we have been deſcribing, and alſo very diſtinct from each other. Theſe are divided by naturaliſts into Cruſtaceous and Teſtaceous Animals: both, totally unlike fiſhes to appearance, ſeem to invert the order of Nature; and as thoſe have their bones on the inſide, and their muſcles hung upon them for the purpoſes of life and motion, theſe, on the contrary, have all their bony parts on the outſide, and all their muſcles within. Not to talk myſteriouſly—all who have ſeen a lobſter or an oyſter, perceive that the ſhell in theſe bears a ſtrong analogy to the bones of other animals; and that, by theſe ſhells, the animal is ſuſtained and defended.

Cruſtaceous fiſh, ſuch as the crab and the lobſter, have a ſhell not quite of a ſtony hardneſs, but rather reſembling a firm cruſt, and in ſome meaſure capable of yielding. Teſtaceous fiſhes, ſuch as the oyſter or cockle, are furniſhed with a ſhell of a ſtony hardneſs; very brittle, and incapable of yielding. Of the cruſtaceous kinds are the Lobſter, the Crab, and the Tortoiſe: of the teſtaceous, that numerous tribe of Oyſters, Muſcles, Cockles, and Sea-Snails, which offer with infinite variety.

The cruſtaceous tribe ſeems to hold the middle rank between fiſhes, properly ſo called, and thoſe ſnail-like animals that receive the name of teſtaceous fiſhes. Their muſcles are ſtrong and firm, as in the former; their ſhell is ſelf-produced, as among the latter. They have motion, and hunt for food with great avidity, like the former. They are incapable of ſwimming, but creep along the bottom, like the latter: in ſhort, they form the link that unites theſe two claſſes, that ſeem ſo very oppoſite in their natures.

Of teſtaceous fiſhes we will ſpeak hereafter. As to animals of the cruſtaceous kind, they are very numerous, their figure offers an hundred varieties: but as to their nature, they are obviouſly divided into two very diſtinct kinds differing in their habits and their conformation. The chief of one kind is the Lobſter; the chief of the other, the Tortoiſe. Under the Lobſter we rank the Prawn, the Craw-Fiſh, the Shrimp, the Sea-Crab, the Land-Crab, and all their varieties. Under the Sea-Tortoiſe, the Turtle, the Hawkſbill-Turtle, the Land-Tortoiſe, and their numerous varieties.

CHAP. II.

CRUSTACEOUS ANIMALS OF THE LOBSTER KIND.

However different in figure the lobſter and the crab may ſeem, their manners and conformation are nearly the ſame. With all the voracious appetites of fiſhes, they are condemned to lead an inſect life at the bottom of the water; and, tho' preſſed by continual hunger, they are often obliged to wait till accident brings them their prey. Though without any warmth in their bodies, or even without red blood circulating through their veins, they are animals wonderfully voracious. Whatever they ſeize upon that has life, is ſure to periſh, though never ſo well defended: they even devour each other: and, to increaſe our ſurpriſe ſtill more, they may, in ſome meaſure, be ſaid to eat themſelves; as they change their ſhell and their ſtomach every year, and their old ſtomach is generally the firſt morſel that ſerves to glut the new.

The lobſter is an animal of ſo extraordinary a form, that thoſe who firſt ſee it are apt to miſtake the head for the tail; but it is ſoon diſcovered that the animal moves with its claws foremoſt; and that the part which plays within itſelf by joints, like a coat of armour, is the tail. The two great claws are the lobſter's inſtruments of proviſion and defence; theſe, by opening like a pair of nippers, have great ſtrength, and take a firm hold; they are uſually notched like a ſaw, which ſtill more increaſes their tenacity. Beſide theſe powerful inſtruments, which may be conſidered as arms, the lobſter has eight legs, four on each ſide, and theſe, with the tail, ſerve to give the animal its progreſſive and ſideling motion. Between the two claws is the animal's head, very ſmall, and furniſhed with eyes that ſeem like two black horny ſpecks on each ſide; and theſe it has a power of advancing out of the ſocket, and drawing in at pleaſure. The mouth, like that of inſects, opens the long way of the body, not croſſways, as with man, and the higher race of animals. It is furniſhed with two teeth for the comminution of its food; but, as theſe are not ſufficient, it has three more in the ſtomach; one on each ſide, and the other below. Between the two teeth there is a fleſhy ſubſtance, in the ſhape of a tongue. The inteſtines conſiſt of one long bowel, which reaches from the mouth to the vent; but what this animal differs in from all others, is, that the ſpinal-marrow is in the breaſt-bone. It is furniſhed with two long feelers or horns, that iſſue on each ſide of the head, that ſeem to correct the dimneſs of its ſight, and apprize the animal of its danger or of its prey. The tail, or that jointed inſtrument at the other end, is the grand inſtrument of motion; and with this it can raiſe itſelf in the water. Under this we uſually ſee lodged the ſpawn in great abundance; every pea adhering to the next by a very fine filament, which is ſcarcely perceivable. Every lobſter is a hermaphrodite, and is ſuppoſed to be ſelf-impregnated! The ovary, or place where the ſpawn is firſt produced, is backwards towards the tail, where a red ſubſtance is always found, and which is nothing but a cluſter of peas, that are yet too ſmall for excluſion. From this receptacle there go two canals, that open on each ſide at the jointures of the ſhell, at the belly; and through theſe paſſages the peas deſcend to be excluded, and placed under the tail, where the animal preſerves them from danger for ſome time, until they come to maturity; when, being furniſhed with limbs and motion, they drop off into the water.

When the young lobſters leave the parent, they immediately ſeek for refuge in the ſmalleſt clefts of rocks, and in ſuch like crevices at the bottom of the ſea, where the entrance is but ſmall, and the opening can be eaſily defended. There, without ſeeming to take any food, they grow larger in a few weeks time, from the mere accidental ſubſtances which the water waſhes to their retreats. By this time, alſo, they acquire a hard, firm ſhell, which furniſhes them with both offenſive and defenſive armour. They then begin to iſſue from their fortreſſes, and boldly creep along the bottom, in hopes of meeting with more diminutive plunder. The ſpawn of fiſh, the ſmaller animals of their own kind, but chiefly the worms that keep at the bottom of the ſea, ſupply them with plenty. They keep in this manner cloſe among the rocks, buſily employed in ſcratching up the ſand with their claws for worms, or ſurpriſing ſuch heedleſs animals as fall within their graſp; thus they have little to apprehend, except from each other; for in them, as among ſiſhes, the large are the moſt formidable of all other enemies to theſmall.

But this life of abundance and ſecurity is ſoon to have a moſt dangerous interruption; for the body of the lobſter ſtill continuing to increaſe, while its ſhell remains unalterably the ſame, the animal becomes too large for its habitation, and impriſoned within the cruſt that has naturally gathered round it, there comes on a neceſſity of getting free. The young of this kind, therefore, that grow faſter, as I am aſſured by the fiſhermen, change their ſhell oftener than the old, who come to their full growth, and who remain in the ſame ſhell often for two years together. In general, however, all theſe animals change their ſhell once a-year; and this is not only a moſt painful operation, but alſo ſubjects them to every danger. Their molting ſeaſon is generally about the beginning of ſummer, at which time their food is in plenty, and their ſtrength and vigour in the higheſt perfection. But ſoon all their activity ceaſes; they are ſeen forſaking the open parts of the deep, and ſeeking ſome retired ſituation among the rocks, or ſome outlet where they may remain in ſafety from the attacks of their various enemies. For ſome days before their change, the animal diſcontinues its uſual voraciouſneſs; it is no longer ſeen laboriouſly harrowing up the ſand at the bottom, or fighting with others of its kind, or hunting its prey; it lies torpid and motionleſs, as if in anxious expectation of the approaching change. Juſt before caſting its ſhell, it throws itſelf upon its back, ſtrikes its claws againſt each other, and every limb ſeems to tremble; its feelers are agitated, and the whole body is in violent motion; it then ſwells itſelf in an unuſual manner, and at laſt the ſhell is ſeen beginning to divide at its junctures; particularly, it opens at the junctures of the belly, where, like a pair of jumps, it was before but ſeemingly united. It alſo ſeems turned inſide out, and its ſtomach comes away with its ſhell. After this, by the ſame operation, it diſengages itſelf of the claws which burſt at the joints; the animal, with a tremulous motion, caſting them off as a man would kick off a boot that was too big for him.

Thus, in a ſhort time, this wonderful creature finds itſelf at liberty; but in ſo weak and enfeebled a ſtate, that it continues for ſeveral hours motionleſs. Indeed, ſo violent and painful is the operation, that many of them die under it; and thoſe which ſurvive are in ſuch a weakly ſtate for ſome time, that they neither take food nor venture from their retreats. Immediately after this change, they have not only the ſoftneſs but the timidity of a worm. Every animal of the deep is then a powerful enemy, which they can neither eſcape nor oppoſe; and this, in fact, is the time when the dog-fiſh, the cod, and the ray, devour them by hundreds. But this ſtate of defenceleſs imbecillity continues for a very ſhort time: the animal, in leſs than two days, is ſeen to have the ſkin that covered its body grown almoſt as hard as before; its appetite is ſeen to increaſe; and, ſtrange to behold! the firſt object that tempts its gluttony, is its own ſtomach, which it ſo lately was diſengaged from. This it devours with great eagerneſs; and ſometime after eats even its former ſhell. In about forty-eight hours, in proportion to the animal's health and ſtrength, the new ſhell is perfectly formed, and as hard as that which was but juſt thrown aſide.

To contribute to the ſpeedy growth of the ſhell, it is ſuppoſed by ſome, that the lobſter is ſupplied with a very extraordinary concretion within its body, that is converted into the ſhelly ſubſtance. It is a chalky ſubſtance, found in the lower part of the ſtomach of all lobſters, improperly called crab's eyes, and ſold under that title in the ſhops. About the time the lobſter quits its ſhell, the teeth in its ſtomach break theſe ſtones to pieces, and the fluids contained therein diſſolve them. This fluid, which ſtill remains in the new ſtomach, is thought to be replete with a petrifying quality, proper for forming a new ſhell: however, the concreting power that firſt formed theſe, ſhews a ſufficient power in the animal to produce alſo the ſhell; and it is going but a ſhort way in the cauſes of things when we attempt to explain one wonder by another.

When the lobſter is completely equipped in its new ſhell, it then appears how much it has grown in the ſpace of a very few days; the dimenſions of the old ſhell being compared with thoſe of the new, it will be found that the creature is increaſed above a third in its ſize; and, like a boy that has outgrown his clothes, it ſeems wonderful how the deſerted ſhell was able to contain ſo great an animal as entirely fills up the new.

The creature thus furniſhed, not only with a complete covering, but alſo a greater ſhare of ſtrength and courage, ventures more boldly among the animals at the bottom; and not a week paſſes, that, in its combats, is does not ſuffer ſome mutilation. A joint, or even a whole claw, is ſometimes ſnapped off in theſe encounters. At certain ſeaſons of the year theſe animals never meet each other without an engagement. In theſe, to come off with the loſs of a leg, or even a claw, is conſidered as no great calamity; the victor carries off the ſpoil to feaſt upon at leaſure, while the other retires from the defeat to wait for a thorough repair. This repair it is not long in procuring. From the place where the joint of the claw was cut away, is ſeen in a moſt ſurpriſing manner to burgeon out the beginning of a new claw. This, if obſerved, at firſt, is ſmall and tender, but grows, in the ſpace of three weeks, to be almoſt as large and as powerful as the old one. I ſay almoſt as large, for it never arrives to the full ſize; and this is the reaſon we generally find the claws of lobſters of unequal magnitude.

After what has been thus deſcribed, let us pauſe a little, to reflect on the wonders this extraordinary creature offers to our imagination! An animal without bones on the inſide, yet furniſhed with a ſtomach capable of digeſting the hardeſt ſubſtances, the ſhells of muſcles, of oyſters, and even its own; an animal gaining a new ſtomach and a new ſhell at ſtated intervals! Furniſhed with the inſtruments of generation double in both ſexes; and yet with an apparent incapacity of uniting! Without red blood circulating through the body, and yet apparently vigorous and active! But, moſt ſtrange of all, an animal endowed with a vital principle that furniſhes out ſuch limbs as have been cut away, and keeps continually combating it, though in conſtant repair to renew its engagements! Theſe are but a ſmall part of the wonders of the deep, where Nature ſports without a ſpectator!

Of this extraordinary yet well-known animal there are many varieties, with ſome differences in the claws, but little in the habits or conformation. It is found above three feet long; and if we may admit the ſhrimp and the prawn into the claſs, though unfurniſhed with claws, it is ſeen not above an inch. Theſe all live in the water, and can bear its abſence for but a few hours. The ſhell is black when taken out of the water, but turns red by boiling. The moſt common way of taking the lobſter is in a baſket, or pot, as the fiſhermen call it, made of wicker-work, in which they put the bait, and then throw it to the bottom of the ſea, in ſix or ten fathoms water. The lobſters creep into this for the ſake of the bait, but are not able to get out again. The river craw-fiſh differs little from the lobſter, but that the one will live only in freſh water, and the other will thrive only in the ſea.

The Crab is an animal found equally in freſh and ſalt water; as well upon land as in the ocean. In ſhape it differs very much from the lobſter, but entirely reſembles it in habits and conformation. The tail in this animal is not ſo apparent as in the former, being that broad flap that ſeems to cover a part of the belly, and when lifted diſcovers the peas or ſpawn, ſituated there in great abundance. It reſembles the lobſter in the number of its claws, which are two; and its legs, which are eight, four on either ſide. Like the lobſter, it is a bold voracious animal; and ſuch an enmity do crabs bear each other, that thoſe who carry them for ſale to market, often tie their claws with ſtrings to prevent their fighting and maiming themſelves by the way. In ſhort, it reſembles the lobſter in every thing but the amazing bulk of its body compared to the ſize of its head, and the length of its inteſtines, which have many convolutions.

As the crab, however, is found upon land as well as in water, the peculiarity of its ſituation produces a difference in its habitudes, which it is proper to deſcribe. The Land Crab is found in ſome of the warmer regions of Europe, and in great abundance in all the tropical climates in Africa and America. They are of various kinds, and endued with various properties; ſome being healthful, delicious, and nouriſhing food; others, poiſonous or malignant to the laſt degree; ſome are not above half an inch broad, others are found a foot over; ſome are of a dirty brown, and others beautifully mottled. That animal called the Violet Crab of the Caribbee Iſlands, is the moſt noted both for its ſhape, the delicacy of its fleſh, and the ſingularity of its manners.

The violet crab ſomewhat reſembles two hands cut through the middle and joined together; for each ſide looks like four fingers, and the two nippers or claws reſemble the thumbs. All the reſt of the body is covered with a ſhell as large as a man's hand and bunched in the middle, on the fore-part of which there are two long eyes of the ſize of a grain of barley, as tranſparent as cryſtal, and as hard as horn. A little below theſe is the mouth, covered with a ſort of barbs, under which there are two broad ſharp teeth as white as ſnow. They are not placed, as in other animals, croſſways, but in the oppoſite direction, not much unlike the blades of a pair of ſciſſars. With theſe teeth they can eaſily cut leaves, fruits, and rotten wood, which is their uſual food. But their principal inſtruments for cutting and ſeizing their food is their nippers, which catch ſuch a hold, that the animal loſes the limb ſooner than its graſp, and is often ſeen ſcampering off, having left its claws ſtill holding faſt upon the enemy. The faithful claw ſeems to perform its duty, and keeps for above a minute faſtened upon the finger while the crab is making off*. In fact, it loſes no great matter by leaving a leg or an arm, for they ſoon grow again, and the animal is found as perfect as before.

This, however, is the leaſt ſurpriſing part of this creature's hiſtory: and what I am going to relate, were it not as well known and as confidently confirmed as any other circumſtance in natural hiſtory, it might well ſtagger our belief. Theſe animals live not only in a kind of orderly ſociety in their retreats in the mountains, but regularly once a year march down to the ſea-ſide in a body of ſome millions at a time. As they multiply in great numbers, they chooſe the months of April or May to begin their expedition; and then ſally out by thouſands from the ſtumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themſelves under the ſurface of the earth. At that time the whole ground is covered with this band of adventurers; there is no ſetting down one's foot without treading upon them†. The ſea is their place of deſtination, and to that they direct their march with right-lined preciſion. No geometrician could ſend them to their deſtined ſtation by a ſhorter courſe; they neither turn to the right nor left, whatever obſtacles intervene; and even if they meet with a houſe, they will attempt to ſcale the walls to keep the unbroken tenor of their way. But though this be the general order of their route, they upon other occaſions are compelled to conform to the face of the country; and if it be interſected by rivers, they are then ſeen to wind along the courſe of the ſtream. The proceſſion ſets forwards from the mountains with the regularity of an army, under the guidance of an experienced commander. They are commonly divided into three battalions; of which, the firſt conſiſts of the ſtrongeſt and boldeſt males, that, like pioneers, march forward to clear the route and face the greateſt dangers. Theſe are often obliged to halt for want of rain, and go into the moſt convenient encampment till the weather changes.—The main body of the army is compoſed of females, which never leave the mountains till the rain is ſet in for ſome time, and then deſcend in regular battalia, being formed into columns of fifty paces broad and three miles deep, and ſo cloſe that they almoſt cover the ground. Three or four days after this the rear-guard follows; a ſtraggling, undiſciplined tribe, conſiſting of males and females, but neither ſo robuſt nor ſo numerous as the former. The night is their chief time of proceeding; but if it rains by day, they do not fail to profit by the occaſion; and they continue to move forward in their ſlow uniform manner. When the ſun ſhines and is hot upon the ſurface of the ground, they then make an univerſal halt, and wait till the cool of the evening. When they are terrified, they march back in a confuſed diſorderly manner, holding up their nippers, with which they ſometimes tear off a piece of the ſkin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if it were to threaten thoſe that come to diſturb them. But though they thus ſtrive to be formidable to man, they are much more ſo to each other; for they are poſſeſſed of one moſt unſocial property, which is, that if any of them by accident is maimed in ſuch a manner as to be incapable of proceeding, the reſt fall upon and devour it on the ſpot, and then purſue their journey.

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* Brown's Jamaica, p. 423.

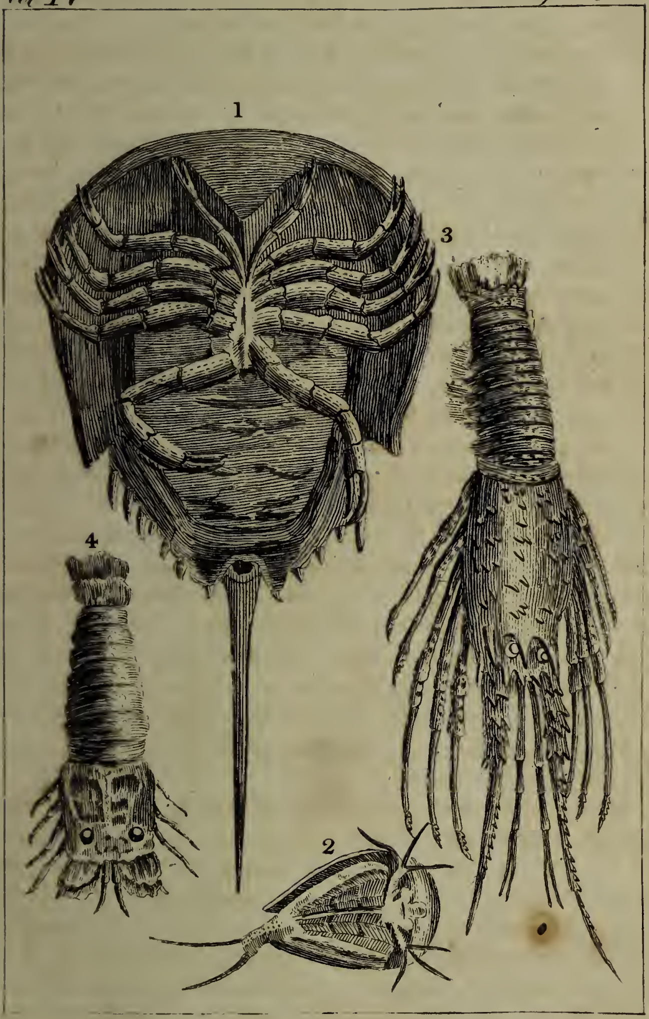
† Lebat. Voyage aux Iſle Françoiſes, vol. ii. p. 221.

When after a fatiguing march and eſcaping a thouſand dangers (for they are ſometimes three months in getting to the ſhore) they have arrived at their deſtined port, they prepare to caſt their ſpawn. The peas are as yet within their bodies, and not excluded, as is uſual in animals of this kind, under the tail; for the creature waits for the benefit of the ſea-water to help the delivery. For this purpoſe, the crab has no ſooner reached the ſhore, than it eagerly goes to the edge of the water, and lets the waves waſh over its body two or three times. This ſeems only a preparation for bringing the ſpawn to maturity; for without farther delay they withdraw to ſeek a lodging upon land: in the mean time, the ſpawn grows larger, is excluded out of the body, and ſticks to the barbs under the flap, or more properly the tail. This bunch is ſeen as big as a hen's egg, and exactly reſembling the roes of herrings. In this ſtate of pregnancy, they once more ſeek the ſhore for the laſt time, and ſhaking off their ſpawn into the water, leave accident to bring it to maturity. At this time whole ſhoals of hungry fiſh are at the ſhore in expectation of this annual ſupply; the ſea to a great diſtance ſeems black with them; and about two thirds of the crabs-eggs are immediately devoured by theſe rapacious invaders. The eggs that eſcape are hatched under the ſand; and ſoon after millions at a time of theſe little crabs are ſeen quitting the ſhore, and ſlowly travelling up to the mountains.

The old ones, however, are not ſo active to return; they have become ſo feeble and lean, that they can hardly creep along, and the fleſh at that time changes its colour. The moſt of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt, ſo that no air may enter. There they throw off their old ſhells, which they leave as it were quite whole, the place where they opened on the belly being unſeen. At that time they are quite naked, and almoſt without motion for ſix days together, when they become ſo fat as to be delicious food. They have then under their ſtomachs four large white ſtones, which gradually decreaſe in proportion as the ſhell hardens, and when they come to perfection are not to be found. It is at that time that the animal is ſeen ſlowly making its way back; and all this is moſt commonly performed in the ſpace of ſix weeks.

This animal when poſſeſſed of its retreats in the mountains is impregnable; for only ſubſiſting upon vegetables, it ſeldom ventures out; and its habitation being in the moſt inacceſſible places, it remains for a great part of the ſeaſon in perfect ſecurity. It is only when impelled by the deſire of bringing forth its young, and when compelled to deſcend into the flat country, that it is taken. At that time the natives wait for its deſcent in eager expectation, and deſtroy thouſands; but diſregarding the bodies, they only ſeek for that ſmall ſpawn which lies on each ſide of the ſtomach within the ſhell, of about the thickneſs of a man's thumb. They are much more valuable upon their return after they have caſt their ſhell; for being covered with a ſkin reſembling ſoft parchment, almoſt every part except the ſtomach may be eaten. They are taken in their holes by feeling for them in the ground with an inſtrument: they are ſought after by night, when on their journey, with flambeaux. The inſtant the animal perceives itſelf attacked, it throws itſelf on its back, and with its claws pinches moſt terribly whatever it happens to faſten on. But the dextrous crab-catcher takes them by the hinder legs in ſuch a manner, that its nippers cannot touch him, and thus he throws it into his bag. Sometimes alſo they are caught when they take refuge at the bottom of holes, in rocks by the ſea-ſide, by clapping a ſtick at the mouth of the hole, which prevents their getting out; and then ſoon after the tide coming, enters the hole, and the animal is found upon its retiring drowned in its retreat.

Theſe crabs are of conſiderable advantage to the natives; and the ſlaves very often feed entirely upon them. In Jamaica, where they are found in great plenty, they are conſidered as one of the greateſt delicacies of the place. Yet ſtill, the eating of them is attended with ſome danger; for even of this kind many are found poiſonous, being fed, as it is thought, upon the machinel apple; and whenever they are found under that noxious plant, they are always rejected with caution. It is thus with almoſt all the productions of thoſe luxurious climates; however tempting they may be to the appetite, they but too often are found deſtructive; and ſcarce a delicacy among them that does not carry its own alloy.



1 The Violet Crab 3 The Sea Lobſter
2 The River Crab 4 The Lobſter Crab

The deſcent of theſe creatures for ſuch important purpoſes, deſerves our admiration; but there is an animal of the lobſter kind that annually deſcends from its mountains in like manner, and for purpoſes ſtill more important and various. Its deſcent is not only to produce an offspring, but to provide itſelf a covering; not only to ſecure a family, but to furniſh a houſe. The animal I mean is the ſoldier-crab, which has ſome ſimilitude to the lobſter, if diveſted of its ſhell. It is uſually about four inches long, has no ſhell behind, but is covered down to the tail with a rough ſkin, terminating in a point. It is, however, armed with ſtrong hard nippers before, like the lobſter; and one of them is as thick as a man's thumb, and pinches moſt powerfully. It is, as I ſaid, without a ſhell to any part except its nippers; but what Nature, has denied this animal it, takes care to ſupply by art; and taking poſſeſſion of the deſerted ſhell of ſome other animal, it reſides in it, till, by growing too large for its habitation, it is under a neceſſity of change. It is a native of the Weſt India Iſlands; and, like the former, it is ſeen every year deſcending from the mountains to the ſea-ſhore, to depoſit its ſpawn, and to provide itſelf with a new ſhell. This is a moſt buſtling time with it, having ſo many things to do; and, in fact, very buſy it appears. It is very probable that its firſt care is to provide for its offspring before it attends to its own wants; and it is thought, from the number of little ſhells which it is ſeen examining, that it depoſits its ſpawn in them, which thus is placed in perfect ſecurity till the time of excluſion.

However this be, the ſoldier is in the end by no means unmindful of itſelf. It is ſtill ſeen in its old ſhell, which it appears to have conſiderably outgrown; for a part of the naked body is ſeen at the mouth of it, which the habitation is too ſmall to hide. A ſhell, therefore, is to be found large enough to cover the whole body; and yet not ſo large as to be unmanageable and unwieldy. To anſwer both theſe ends it is no eaſy matter, nor the attainment of a ſlight inquiry. The little ſoldier is ſeen buſily parading the ſhore along that line of pebbles and ſhells that is formed by the extremeſt wave; ſtill, however, dragging its old incommodius habitation at its tail, unwilling to part with one ſhell, even though a troubleſome appendage, till it can find another more convenient. It is ſeen ſtopping at one ſhell, turning it and paſſing it by, going on to another, contemplating that for a while, and then ſlipping its tail from its old habitation, to try on the new. This alſo is found to be inconvenient; and it quickly returns to its old ſhell again. In this manner it frequently changes, till at laſt it finds one light, roomy, and commodious; to this it adheres, though the ſhell be ſometimes ſo large as to hide the body of the animal, claws and all *.

Yet it is not till after many trials, but many combats alſo, that the ſoldier is thus completely equipped; for there is often a conteſt between two of them for ſome well-looking favourite ſhell for which they are rivals. They both endeavour to take poſſeſſion; they ſtrike with their claws, they bite each other, till the weakeſt is obliged to yield, by giving up the object of diſpute. It is then that the victor immediately takes poſſeſſion, and parades it in his new conqueſt three or four times back and forward upon the ſtrand before his envious antagoniſt.

When this animal is taken, it ſends forth a feeble cry, endeavouring to ſeize the enemy with its nippers; which if it faſtens upon it will ſooner die than quit the graſp. The wound is very painful, and not eaſily cured. For this reaſon, and as it is not much eſteemed for its fleſh, it is generally permitted to return to its old retreat to the mountains in ſafety. There it continues till the neceſſity of changing once more, and the deſire of producing an offspring, expoſe it to freſh dangers the year enſuing.

CHAP. III.

OF THE TORTOISE AND ITS KINDS.

HAVING deſcribed the lobſter and the crab as animals in ſome meaſure approaching to the inſect tribes, it will appear like injuſtice to place the Tortoiſe among the number, that, from its ſtrength, its docility, the warm red blood that is circulating in its veins, deſerves to be ranked even above the

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* Pere du Teſtre.

fiſhes. But as this animal is covered, like the lobſter, with a ſhell, as it is of an amphibious nature, and brings forth its young from the egg without hatching, we muſt be content to degrade it among animals that in every reſpect it infinitely ſurpaſſes.

Tortoiſes are uſually divided into thoſe that live upon land, and thoſe that ſubſiſt in the water; and uſe has made a diſtinction even in the name; the one being called Tortoiſes, the other Turtles. However, Seba has proved that all tortoiſes are amphibious; that the land tortoiſe will live in the water, and that the ſea turtle can be fed upon land. A land tortoiſe was brought to him that was caught in one of the canals of Amſterdam, which he kept for half a year in his houſe, where it lived very well contented in both elements. When in the water it remained with its head above the ſurface; when placed in the ſun, it ſeemed delighted with its beams, and continued immoveable while it felt their warmth. The difference, therefore, in theſe animals, ariſes rather from their habits than their conformation; and, upon examination, there will be leſs variety found between them than between birds that live upon land, and thoſe that ſwim upon the water.

Yet, though Nature ſeems to have made but few diſtinctions among theſe animals, as to their conformation, yet, in their habits, they are very diſſimilar; as theſe reſult from the different qualities of their food, and the different ſorts of enemies they have to avoid or encounter. I will therefore exhibit their figure and conformation under one common deſcription, by which their ſlight differences will be more obvious; and then I will give a ſeparate hiſtory of the manners of each, as naturaliſts and travellers have taught us.

All tortoiſes, in their external form, pretty much reſemble each other; their outward covering being compoſed of two great ſhells, the one laid upon the other, and only touching at the edges: however, when we come to look cloſer, we ſhall find that the upper ſhell is compoſed of no leſs than thirteen pieces, which are laid flat upon the ribs, like the tiles of a houſe, by which the ſhell is kept arched and ſupported. The ſhells both above and below, that, which ſeem, to an inattentive obſerver, to make each but one piece, are bound together at the edges by very ſtrong and hard ligaments, yet with ſome ſmall ſhare of motion. There are two holes at either edge of this vaulted body; one for a very ſmall head, ſhoulders, and arms to peep through; the other at the oppoſite edge, for the feet and the tail Theſe ſhells the animal is never diſengaged from; and they ſerve for its defence againſt every creature but man.

The tortoiſe has but a ſmall head, with no teeth; having only two bony ridges in the place, ſerrated and hard. Theſe ſerve to gather and grind its food; and ſuch is the amazing ſtrength of the jaws, that it is impoſſible to open them where they have once faſtened. Even when the head is cut off, the jaws ſtill keep their hold; and the muſcles, in death, preſerve a tenacious rigidity. Indeed, the animal is poſſeſſed of equal ſtrength in all other parts of its body: the legs, though ſhort, are inconceivably ſtrong; and torpid as the tortoiſe may appear, it has been known to carry five men ſtanding upon its back, with apparent eaſe and unconcern. Its manner of going forward is by moving its legs one after the other; and the claws with which the toes are furniſhed, ſink into the ground like the nails of an iron-ſhod wheel, and aſſiſt its progreſſion.

With reſpect to its internal parts, not to enter into minute anatomical diſquiſitions, it may not be improper to obſerve, that the blood circulates in this animal as in ſome cartilaginous fiſhes, and ſomething in the manner of a child in the womb. The greateſt quantity of the blood paſſes directly from the vena cava into the left ventricle of the heart, which communicates with the right ventricle by an opening; while the auricles only receive what the ventricles ſeem incapable of admitting. Thus the blood is driven by a very ſhort paſſage through the circulation; and the lungs ſeem to lend only occaſional aſſiſtance. From this conformation the animal can ſubſiſt for ſome time, without uſing the lungs or breathing; at leaſt, the lungs are not ſo neceſſary an inſtrument for driving on the circulation as with us.

Such is the general ſtructure of this animal, whether found to live by land or water. With regard to the differences of theſe animals, the land-tortoiſe, from its habits of making uſe of its feet in walking, is much more nimble upon land than the ſea-turtle: the land-tortoiſe, if thrown upon its back, by rocking and balancing its body, like a child rocking in a cradle, at laſt turns itſelf upon its face again; but the turtle, when once turned, continues without being able to move from the ſpot. In comparing the feet alſo of theſe animals, the nails upon the toes of one that has been long uſed to ſcratch for ſubſiſtence upon land, are blunt and worn; while thoſe that have only been employed in ſwimming, are ſharp and long, and have more the ſimilitude of fins. The brain of the land-tortoiſe is but ſmall; and yet it is three times as large as that of the turtle. There is a difference alſo in the ſhape of their eggs, and in the paſſage by which they are excluded; for, in the land-tortoiſe, the paſſage is ſo narrow, that the egg conforms to the ſhape of the aperture, and though round when in the body, yet becomes much more oblong than thoſe of fowls, upon being excluded; otherwiſe they would never be able to paſs through the bony canal by which they are protruded: on the contrary, the paſſage is wider in the turtle, and therefore its eggs are round. Theſe are the moſt ſtriking diſtinctions; but that which is moſt known is their ſize; the land-tortoiſe often not exceeding three feet long, by two feet broad; the ſea-turtle being ſometimes from five to ſeven feet long. The ſize, however, is but a fallacious diſtinction; ſince land-tortoiſes, in ſome parts of India, grow to a very great magnitude; though probably not, as the ancients affirm, big enough for a ſingle ſhell to ſerve for the covering of a houſe.

But if the different kinds of tortoiſes are not ſufficiently diſtinguiſhed by their figure, they are very obviouſly diſtinguiſhable by their methods of living. The land-tortoiſe lives in holes dug in the mountains, or near marſhy lakes; the ſea-turtle in cavities of rocks, and extenſive paſtures at the bottom of the ſea. The tortoiſe makes uſe of its feet to walk with, and burrow in the ground; the turtle chiefly uſes its feet in ſwimming, or creeping at the bottom.

The land-tortoiſe is generally found, as was obſerved above, from one foot to five feet long, from the end of the ſnout to the end of the tail; and from five inches to a foot and a half acroſs the back. It has a ſmall head, ſomewhat reſembling that of a ſerpent; an eye without the upper lid; the under eye-lid ſerving to cover and keep that organ in ſafety. It has a ſtrong ſcaly tail, like the lizard. Its head the animal can put out and hide at pleaſure, under the great penthouſe of its ſhell: there it can remain ſecure from all attacks; there, defended on every ſide, it can fatigue the patience of the moſt formidable animal of the foreſt, that makes uſe only of natural ſtrength to deſtroy it. As the tortoiſe lives wholly upon vegetable food, it never ſeeks the encounter; yet, if any of the ſmaller animals attempt to invade its repoſe, they are ſure to ſuffer. The tortoiſe, impregnably defended, is furniſhed with ſuch a ſtrength of jaw, that, tho' armed only with bony plates inſtead of teeth, wherever it faſtens, it infallibly keeps its hold, until it has taken out the piece.

Though peaceable in itſelf, it is formed for war in another reſpect, for it ſeems almoſt endued with immortality. Nothing can kill it; the depriving it of one of its members, is but a ſlight injury; it will live though deprived of the brain; it will live, though deprived of its head. Rhedi informs us, that, in making ſome experiments upon vital motion, he, in the beginning of the month of November, took a land-tortoiſe, made a large opening in its ſkull, and drew out all the brain, waſhed the cavity, ſo as not to leave the ſmalleſt part remaining, and then, leaving the hole open, ſet the animal at liberty. Notwithſtanding this the tortoiſe marched away without ſeeming to have received the ſmalleſt injury; only it ſhut the eyes, and never opened them afterwards. Soon after the hole in the ſkull was ſeen to cloſe; and, in three days, there was a complete ſkin covering the wound. In this manner the animal lived without a brain, for ſix months; walking about unconcernedly, and moving its limbs as before. But the Italian philoſopher, not ſatisfied with this experiment, carried it ſtill farther; for he cut off the head, and the animal lived twenty-three days after its ſeparation from the body. The head alſo continued to rattle the jaws, like a pair of caſtanets, for above a quarter of an hour.

Nor are theſe animals leſs long-lived than difficult in deſtroying. Tortoiſes are commonly known to exceed eighty years old; and there was one kept in the Archbiſhop of Canterbury's garden at Lambeth, that was remembered above a hundred and twenty. It was at laſt killed by the ſeverity of a froſt, from which it had not ſufficiently defended itſelf in its winter retreat, which was a heap of ſand, at the bottom of the garden.

The uſual food of the land-tortoiſe ſeems not ſo nouriſhing as to ſupply this extraordinary principle of vitality. It lives upon vegetables in its retreats in the mountains or the plain; and ſeldom makes its prey of ſnails or worms, but when other food is not found in grateful plenty. It is fond alſo of fruits; and when the foreſt affords them, is generally found not far from where they grow. As it can move but ſlowly, it is not very delicate in the choice of its food; ſo that it uſually fills itſelf with whatever offers. Thoſe that are kept in a domeſtic ſtate, will eat any thing; leaves, fruits, corn, bran, or graſs.

From the ſmallneſs of its brain, and the ſlowneſs of its motion, it obviouſly appears to be a torpid, heavy animal, requiring reſt and ſleep; and, in fact, it retires to ſome cavern to ſleep for the winter. I already obſerved that its blood circulated through the heart by a ſhort paſſage; and that it did not, as anatomiſts expreſs it, go through the great circulation. With us and quadrupeds the blood goes from the veins to the heart; from the heart it is ſent to be ſpread over the lungs; from the lungs it returns to the heart again, and from thence it goes to the arteries, to be diſtributed through the whole body. But its paſſage in the tortoiſe is much ſhorter; for, from the veins it goes to the heart; then leaving the lungs entirely out of its courſe, it takes a ſhort cut, if I may ſo ſay, into the beginning of the arteries, which ſend it round the animal frame. From hence we ſee the lungs are left out of the circulation; and conſequently, the animal is capable of continuing to live without continuing to breathe. In this it reſembles the bat, the ſerpent, the mole, and the lizard; like them it takes up its dark reſidence for the winter; and, at that time, when its food is no longer in plenty, it happily becomes inſenſible to the want. Nor is it unmindful to prepare its retreat, and make it as convenient as poſſible; it is ſometimes buried two or three feet in the ground, with its hole furniſhed with moſs, graſs, and other ſubſtances, as well to keep the retreat warm, as to ſerve for food, in caſe it ſhould prematurely wake from its ſtate of ſtupefaction. But it muſt not be ſuppoſed that, while it is thus at reſt, it totally diſcontinues to breathe; on the contrary, an animal of this kind, if put into a cloſe veſſel, without air, will ſoon be ſtifled; though not ſo readily as in a ſtate of vigour and activity.

From this dormant ſtate the tortoiſe is awakened by the genial return of ſpring; and is thought not to be much waſted by its long confinement. To animals that live an hundred and fifty years, a ſleep of ſix months is but as the nap of a night. All the actions of theſe long-lived creatures ſeem formed upon a ſcale anſwering the length of their exiſtence: their ſlumbers are for a ſeaſon; their motions are ſlow, and require time in every action: even the act of procreation, which among other animals is performed in a very few minutes, is with them the buſineſs of days. About a month after their enlargement from a torpid ſtate, they prepare to tranſmit their poſterity; and both continue joined, for near a month, together. The eggs of the female are contained in the ovary, above the bladder, which is extremely large; and theſe are, before their excluſion, round and naked, with ſome ſpots of red: After they are laid, however, they aſſume another form, being ſmaller and longer than thoſe of a hen. This alteration in the figure of the eggs moſt probably proceeds from the narrowneſs of the bony paſſage through which they are excluded. Swammerdam, who compared the ſize of the eggs taken out of this animal's body with the diameter of the paſſage through which they were excluded, was of opinion that the bones themſelves ſeparated from each other, and cloſed again; but, in my opinion, it is more probable to ſuppoſe, that the eggs, and not the bones, alter their form. Certain it is, that they are round in the body, and that they are oval upon being protruded.

The eggs of all the tortoiſe kind, like thoſe of birds, are furniſhed with a yolk and a white; but the ſhell is different, being ſomewhat like thoſe ſoft eggs that hens exclude before their time: however, this ſhell is much thicker and ſtronger, and is a longer time in coming to maturity in the womb. The land tortoiſe lays but a few in number, if compared to the ſea turtle, who depoſits from a hundred and fifty to two hundred in a ſeaſon.

The amount of the land tortoiſe's eggs I have not been able to learn; but, from the ſcarceneſs of the animal, I am apt to think they cannot be very numerous. When it prepares to lay, the female ſcratches a ſlight depreſſion in the earth, generally in a warm ſituation, where the beams of the ſun have their full effect: there depoſiting her eggs, and covering them with graſs and leaves, ſhe forſakes them, to be hatched by the heat of the ſeaſon. The young tortoiſes are generally excluded in about twenty-ſix days; but, as the heat of the weather aſſiſts, or its coldneſs retards incubation, ſometimes it happens that there is a difference of two or three days. The little animals no ſooner leave the egg than they ſeek for their proviſion, entirely ſelf-taught; and their ſhell, with which they are covered from the beginning, expands and grows larger with age: As it is compoſed of a variety of pieces, they are all capable of extenſion at their ſutures, and the ſhell admits of increaſe in every direction. It is otherwiſe with thoſe animals, like the lobſter, whoſe ſhell is compoſed all of one piece, that admits of no increaſe; which, when the tenant is too big for the habitation, muſt burſt the ſhell, and get another. But the covering of the tortoiſe grows larger in proportion as the internal parts expand; in ſome meaſure reſembling the growth of the human ſkull, which is compoſed of a number of bones, increaſing in ſize in proportion to the quantity of the brain. All tortoiſes, therefore, as they never change their ſhell, muſt have it formed in pieces; and though, in ſome that have been deſcribed by painters or hiſtorians, theſe marks have not been attended to, yet we can have no doubt that they are general to the whole tribe.

It is common enough to take theſe animals into gardens, as they are thought to deſtroy inſects and ſnails in great abundance. We are even told that, in hot countries, they are admitted into a domeſtic ſtate, as they are great deſtroyers of bugs. How ſo large and heavy an animal is capable of being expert at ſuch petty prey, is not eaſy to conceive; but I have ſeen ſeveral of them about gentlemen's houſes, that, in general, appear torpid, harmleſs, and even fond of employment. Children have ſometimes got upon the back of a tortoiſe; and ſuch was the creature's ſtrength, that it never ſeemed overloaded, but moved off with its burden to where it expected to be fed, but would carry them no further. In winter they regularly find out a place to ſleep in; but in thoſe warm countries in which the tortoiſe is found larger, and in greater plenty than in Europe, they live, without retiring, the whole year round.

The Sea Tortoiſe, or Turtle as it is now called, is generally found larger than the former. This element is poſſeſſed with the property of increaſing the magnitude of thoſe animals, which are common to the land and the ocean. The ſea pike is larger than that of freſh-water; the ſea bear is larger than that of the mountains; and the ſea turtle exceeds the land tortoiſe in the ſame proportion. It is of different magnitudes, according to its different kinds; ſome turtles being not above fifty pounds weight, and ſome above eight hundred.

The Great Mediterranean Turtle is the largeſt of the turtle kind with which we are acquainted. It is found from five to eight feet long, and from ſix to nine hundred pounds weight. But unluckily, its utility bears no proportion to its ſize; as it is unfit for food, and ſometimes poiſons thoſe who eat it. The ſhell alſo, which is a tough ſtrong integument, reſembling an hide, is unfit for all ſerviceable purpoſes. One of theſe animals was taken in the year 1729, at the mouth of the Loire, in nets that were not deſigned for ſo large a capture. This turtle, which was of enormous ſtrength, by its own ſtruggles involved itſelf in the nets in ſuch a manner as to be incapable of doing miſchief: yet, even thus ſhackled, it appeared terrible to the fiſhermen, who were at firſt for flying; but finding it impotent, they gathered courage to drag it on ſhore, where it made a moſt horrible bellowing; and when they began to knock it on the head with their gaffs, it was to be heard at half a mile's diſtance. They were ſtill further intimidated by its nauſeous and peſtilential breath, which ſo powerfully affected them, that they were near fainting. This animal wanted but four inches of being eight feet long, and was above two feet over: its ſhell more reſembled leather than the ſhell of a tortoiſe; and, unlike all other animals of this kind, it was furniſhed with teeth in each jaw, one rank behind another, like thoſe of a ſhark: its feet alſo, different from the reſt of this kind, wanted claws; and the tail was quite diſengaged from the ſhell, and fifteen inches long, more reſembling that of a quadruped than a tortoiſe. This animal was then unknown upon the coaſts of France; and was ſuppoſed to have been brought into the European ſeas, in ſome India ſhip that might be wrecked upon her return. Since that, however, two or three of theſe animals have been taken upon the coaſts; two in particular upon thoſe of Cornwall, in the year 1756, the largeſt of which weighed eight hundred pounds; and one upon the Iſle of Rhe, but two years before that, weighed between ſeven and eight hundred. One, moſt probably of this kind alſo, was caught about thirty years ago near Scatborough, and a good deal of company was invited to feaſt upon it: a gentleman, who was one of the gueſts, told the company that it was a Mediterranean turtle, and not wholeſome; but a perſon, who was willing to ſatisfy his appetite at the riſk of his life, eat of it: he was ſeized with a violent vomiting and purging; but his conſtitution overpowered the malignity of the poiſon.

Theſe are a formidable and uſeleſs kind, if compared to the turtle caught in the South Seas and the Indian Ocean. Theſe are of different kinds; not only unlike each other in form, but furniſhing man with very different advantages. They are uſually diſtinguiſhed by ſailors into four kinds; the Trunk Turtle, the Loggerhead, the Hawkſbill, and the Green Turtle.

The Trunk Turtle is commonly larger than the reſt, and its back higher and rounder. The fleſh of this is rank, and not very wholeſome.

The Loggerhead is ſo called from the largeneſs of its head, which is much bigger in proportion than that of the other kinds. The fleſh of this alſo is very rank, and not eaten but in caſe of neceſſity.

The Hawkſbill Turtle is the leaſt of the four, and has a long and ſmall mouth, ſomewhat reſembling the bill of an hawk. The fleſh of this alſo is very indifferent eating; but the ſhell ſerves for the moſt valuable purpoſes. This is the animal that ſupplies the tortoiſe-ſhell, of which ſuch a variety of beautiful trinkets are made. The ſubſtance of which the ſhells of other turtles are compoſed, is thin and porous; but that of the hawkſbill is firm, and, when poliſhed, is beatifully marbled. They generally carry about three pounds; but the largeſt of all ſix pounds. The ſhell conſiſts, as in all the kind, of thirteen leaves or plates, of which eight are flat, and five hollow. They are raiſed and taken off by means of fire, which is made under the ſhell after the fleſh is taken out. As ſoon as the heat affects the leaves, they ſtart from the ribs, and are eaſily raiſed with the point of a knife. By being ſcraped and poliſhed on both ſides, they become beautifully tranſparent, or are eaſily caſt into what form the workman thinks proper, by making them ſoft and pliant in warm water, and then ſcrewing them in a mold, like a medal: however, the ſhell is moſt beautiful before it undergoes this laſt operation.

But of all animals of the tortoiſe kind, the green turtle is the moſt noted, and the moſt valuable. The delicacy of its fleſh, and its nutritive qualities, together with the property of being eaſily digeſted, were, for above a century, known only to our ſeamen and the inhabitants of the coaſts where they were taken. It was not till by ſlow degrees the diſtinction came to be made between ſuch as were malignant and ſuch as were wholeſome. The controverſies and contradictions of our old travellers were numerous upon this head; ſome aſſerting, that the turtle was delicious food; and others, that it was actual poiſon. Dampier, that rough ſeaman, who has added more to natural hiſtory than half of the philoſophers that went before him, appears to be the firſt who informed us of their diſtinctions; and that, while the reſt might be valuable for other purpoſes, the green turtle alone was chiefly prized for the delicacy of its fleſh. He never imagined, however, that this animal would make its way to the luxurious tables of Europe; for he ſeems chiefly to recommend it as ſalted up for ſhip's proviſion, in caſe of neceſſity.

At preſent the turtle is very well known among us, and is become the favourite food of thoſe that are deſirous of eating a great deal without the danger of ſurfeiting. This is a property the fleſh of the turtle ſeems peculiarly poſſeſſed of; and by the importation of it alive among us, gluttony is freed from one of its greateſt reſtraints. The fleſh of the turtle is become a branch of commerce; and therefore ſhips are provided with conveniences for ſupplying them with water and proviſion, to bring them over in health from Jamaica and other Weſt India iſlands. This, however, is not always effected; for though they are very vivacious and ſcarce require any proviſion upon the voyage, yet, by the

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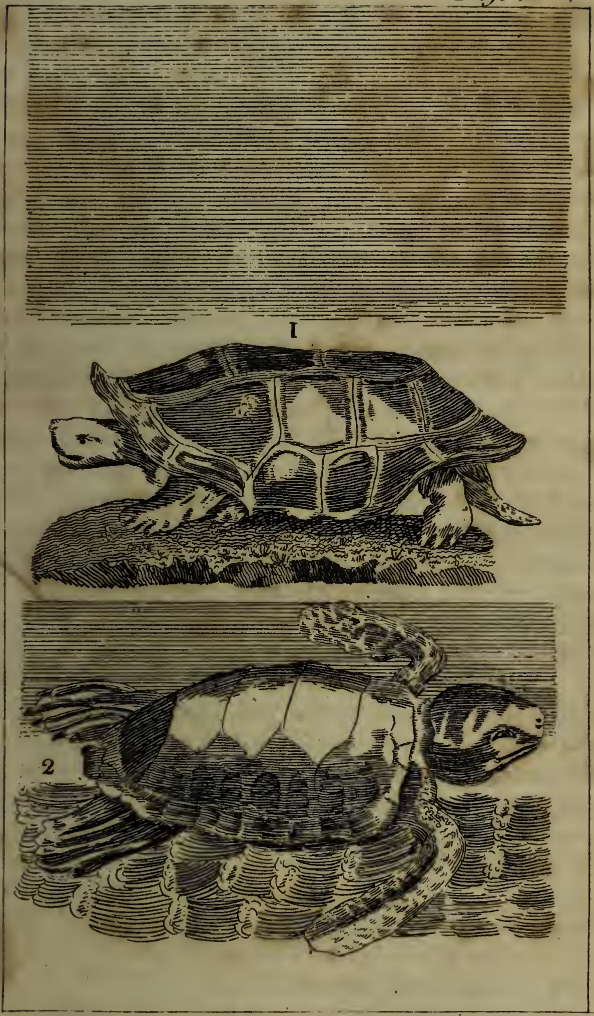

1 The Land Tortoiſe 28
2 The Sea Tortoiſe 22

working of the ſhip and their beating againſt the ſides of the boat that contains them, they become battered and lean; ſo that to eat this animal in the higheſt perfection, inſtead of bringing the turtle to the epicure, he ought be tranſported to the turtle.

This animal is called the green turtle, from the colour of its ſhell, which is rather greener than that of others of this kind. It is generally found about two hundred weight; though ſome are five hundred, and others not above fifty. Dampier tells us of one that was ſeen at Port-Royal in Jamaica, that was ſix feet broad acroſs the back: he does not tell us its other dimenſions; but ſays, that the ſon of Captain Roach, a boy about ten years old, ſailed in the ſhell, as in a boat, from the ſhore to his father's ſhip, which was above a quarter of a mile from land. But this is nothing to the ſize of ſome turtles the ancients ſpeak of. Ælian aſſures us, that the houſes in the iſland of Taprobane are uſually covered with a ſingle ſhell. Diodorus Siculus tells us, that a people neighbouring on Ethiopia, called the *Turtle-eaters*, coaſted along the ſhore in boats made of the upper ſhell of this animal; and that in war, when they had eaten the fleſh, the covering ſerved them as a tent. In this account, Pliny, and all the reſt of the ancients agree; and as they had frequent opportunities of knowing the truth, we are not lightly to contradict their teſtimony.

At preſent, however, they are not ſeen of ſuch amazing dimenſions. We are told, by Laet, that on the iſle of Cuba they grow to ſuch a ſize, as that five men can ſtand on the back of one of them together; and what is more ſurpriſing ſtill, that the animal does not ſeem overloaded, but will go off with them upon its back, with a ſlow ſteady motion, towards the ſea.

They are found in the greateſt numbers on the iſland of Aſcenſion; where, for ſeveral years, they were taken to be ſalted to feed the ſlaves, or for a ſupply of ſhip's proviſion. Their value at preſent ſeems to be better known.

This animal ſeldom comes from the ſea but to depoſit their eggs, and now and then to ſport in freſh-water. Its chief food is a ſubmarine plant, that covers the bottom of ſeveral parts of the ſea not far from the ſhore. There the turtles are ſeen, when the weather is fair, feeding in great numbers, like flocks of ſheep, ſeveral fathoms deep upon the verdant carpet below. At other times they go to the mouths of rivers; and they ſeem to find gratification in freſh-water. After ſome time thus employed, they ſeek their former ſtations; and when done feeding, they generally float with their heads above water, unleſs they are alarmed by the approach of hunters or birds of prey, in which caſe they ſuddenly plunge to the bottom. They often ſeek their proviſion among the rocks, feeding upon moſs and ſea-weed; and it is probable will not diſdain to prey upon inſects and other ſmall animals, as they are very fond of fleſh when taken and fed for the table.

At the time of breeding, they are ſeen to forſake their former haunts and their food, and to take ſometimes a voyage of nine hundred miles to depoſit their eggs on ſome favourite ſhore. The coaſts they always reſort to upon theſe occaſions are thoſe that are low, flat, and ſandy; for being heavy animals, they cannot climb a bold ſhore; nor is any bed ſo proper as ſand to lay their eggs on. They couple in March, and continue united till May; during a great part of which time they are ſeen locked together, and almoſt incapable of ſeparation. The female ſeems paſſive and reluctant; but the male graſps her with his claws in ſuch a manner, that nothing can induce him to quit his hold. It would ſeem that the graſp, as in frogs, is in ſome meaſure convulſive, and that the animal is unable to relax its efforts.

When the time for laying approaches, the female is ſeen towards the ſetting of the ſun drawing near the ſhore, and looking earneſtly about her, as if afraid of being diſcovered. When ſhe perceives any perſon on ſhore, ſhe ſeeks for another place; but if otherwiſe, ſhe lands when it is dark, and goes to take a ſurvey of the ſand where ſhe deſigns to lay. Having marked the ſpot, ſhe goes back without laying for that night, to the ocean again: but the next night returns to depoſit a part of her burthen. She begins by working and digging in the ſand with her fore-feet till ſhe has made a round hole, a foot broad and a foot and a half deep, juſt at the place a little above where the water reaches higheſt. This done, ſhe lays eighty or ninety eggs at a time, each as big as a hen's egg, and as round as a ball. She continues laying about the ſpace of an hour; during which time, if a cart were driven over her, ſhe would not be induced to ſtir.—The eggs are covered with a tough white ſkin, like wetted parchment. When ſhe has done laying, ſhe covers the hole ſo dexterouſly, that it is no eaſy matter to find the place; and theſe muſt be accuſtomed to the ſearch to make the diſcovery. When the turtle has done laying ſhe returns to the ſea, and leaves her eggs to be hatched by the heat of the ſun. At the end of fifteen days ſhe lays about the ſame number of eggs again; and at the end of another fifteen days ſhe repeats the ſame; three times in all, uſing the ſame precautions every time for their ſafety.

In about twenty-four or twenty-five days after laying, the eggs are hatched by the heat of the ſun; and the young turtles, being about as big as quails, are ſeen burſting from the ſand, as if earth-born, and running directly to the ſea, with inſtinct only for their guide: but, to their great misfortune, it often happens that, their ſtrength being ſmall, the ſurges of the ſea, for ſome few days, beat them back upon the ſhore. Thus expoſed, they remain a prey to thouſands of birds that then haunt the coaſts; and theſe ſtooping down upon them carry off the greateſt part, and ſometimes the whole brood, before they have ſtrength ſufficient to withſtand the waves, or dive to the bottom. Helbigius informs us, that they have ſtill another enemy to fear, which is no other than the parent that produced them, that waits for their arrival at the edge of the deep, and devours as many as ſhe can. This circumſtance, however, demands further confirmation; though nothing is more certain than that the crocodile acts in the ſame unnatural manner.

When the turtles have done laying they then return to their accuſtomed places of feeding. Upon their out-ſet to the ſhore, where they breed, they are always found fat and healthy; but upon their return, they are weak, lean, and unfit to be eaten. They are ſeldom, therefore, moleſted upon their retreat; but the great art is to ſeize them when arrived, or to intercept their arrival. In theſe uninhabited iſlands, to which the green turtle chiefly reſorts, the men that go to take them land about night fall, and without making any noiſe (for thoſe animals, though without any external opening of the ear, hear very diſtinctly, there being an auditory conduit that opens into the mouth) lie cloſe while they ſee the female turtle coming on ſhore. They let her proceed to her greateſt diſtance from the ſea; and, then, when ſhe is moſt buſily employed in ſcratching a hole in the ſand, they ſally out and ſurpriſe her. Their manner is to turn her upon her back, which utterly incapacitates her from moving; and yet, as the creature is very ſtrong and ſtruggles very hard, two men find it no eaſy matter to lay her over. When thus ſecured they go to the next; and in this manner, in leſs than three hours, they have been known to turn forty or fifty turtles, each of which weighs from a hundred and fifty to two hundred pounds. Labat aſſures us, that when the animal is in this helpleſs ſituation, it is heard to ſigh very heavily, and even to ſhed tears.

At preſent, from the great appetite that man has diſcovered for this animal, they are not only thinned in their numbers, but are alſo grown much more ſhy. There are ſeveral other ways, therefore contrived for taking them. One is, to ſeize them when coupled together, at the breeding ſeaſon, when they are very eaſily approached, and as eaſily ſeen; for theſe animals, though capable of living for ſome time under water, yet riſe every eight or ten minutes to breathe. As ſoon as they are thus perceived, two or three people draw near them in a canoe, and ſlip a nooze either round their necks or one of their feet. If they have no line, they lay hold of them by the neck, where they have no ſhell, with their hands only; and by this means they uſually catch them both together. But ſometimes the female eſcapes, being more ſhy than the male.

Another way of taking them is by the harpoon, either when they are playing on the ſurface of the water, or feeding at the bottom; when the harpoon is ſkilfully darted, it ſticks faſt in the ſhell of the back; the wood then diſengages from the iron, and the line is long enough for the animal to take its range; for if the harpooner ſhould attempt at once to draw the animal into his boat till it is weakened by its own ſtruggling, it would probably get free. Thus the turtle ſtruggles hard to get looſe, but all in vain; for they take care the line faſtened to the harpoon ſhall be ſtrong enough to hold it.

There is yet another way which, though ſeemingly awkward, is ſaid to be attended with very great ſucceſs. A good diver places himſelf at the head of the boat; and when the turtles are obſerved, which they ſometimes are in great numbers, aſleep on the ſurface, he immediately quits the veſſel, at about fifty yards diſtance, and keeping ſtill under water, directs his paſſage to where the turtle was ſeen, and coming up beneath, ſeizes it by the tail; the animal awaking, ſtruggles to get free; and by this both are kept at the ſurface until the boat arrives to take them in.

CHAP. IV.

OF THE SHELL OF TESTACEOUS FISHES

ONE is apt to combine very diſſimilar objects in the ſame group, when hurried into the vortex of method. No two animals are more unlike each other than the whale and the limpet, the tortoiſe and the oyſter. Yet, as theſe animals muſt find ſome place in the picture of Animated Nature, it is beſt to let them reſt in the ſtation where the generality of mankind have aſſigned them; and as they have been willing to give them all from their abode the name of fiſhes, it is wiſeſt in us to conform.

But before I enter into any hiſtory of ſhell-fiſh, it may not be improper to obſerve, that naturaliſts who have treated on this part of hiſtory, have entirely attended to outward forms; and, as in many other inſtances, forſaking the deſcription of the animal itſelf, have exhauſted all their induſtry in deſcribing the habitation. In conſequence of this radical error, we have volumes written upon the ſubject of ſhells, and very little ſaid on the hiſtory of ſhell-fiſh. The life of theſe induſtrious creatures, that for the moſt part creep along the bottom, or immoveably wait till driven as the waves happen to direct, is almoſt entirely unknown. The wreathing of their ſhells, or the ſpots with which they are tinctured, have been deſcribed with a moſt diſguſting prolixity; but their appetites and their combats, their eſcapes and humble arts of ſubſiſtence, have been utterly neglected.

As I have only undertaken to write the hiſtory of Animated Nature, the variety of ſhells, and their peculiar ſpots or blemiſhes, do not come within my deſign. However, the manner in which ſhells are formed is a part of natural hiſtory connected with my plan, as it pre-ſuppoſes vital force or induſtry in the animal that forms them.

The ſhell may be conſidered as a habitation ſupplied by Nature. It is a hard ſtony ſubſtance, made up ſomewhat in the manner of a wall. Part of the ſtony ſubſtance the animal derives from outward objects, and the fluids of the animal itſelf furniſh the cement. Theſe united make that firm covering which ſhell-fiſh generally reſide in till they die.

But, in order to give a more exact idea of the manner in which ſea ſhells are formed, we muſt have recourſe to an animal that lives upon land, with the formation of whoſe ſhell we are beſt acquainted. This is the garden-ſnail, that carries its box upon its back, whoſe hiſtory Swammerdam has taken ſuch endleſs pains to deſcribe. As the manner of the formation of this animal's ſhell extends to that of all others that have ſhells, whether they live upon land or in the water, it will be proper to give it a place before we enter upon the hiſtory of teſtaceous fiſhes.

To begin with the animal in its earlieſt ſtate, and trace the progreſs of its ſhell from the time it firſt appears.—The inſtant the young ſnail leaves the egg, it carries its ſhell or its box on its back. It does not leave the egg till it is arrived at a certain growth, when its little habitation is ſufficiently hardened. This beginning of the ſhell is not much bigger than a pin's head, but grows in a very rapid manner, having at firſt but two circumvolutions, for the reſt are added as the ſnail grows larger. In proportion as the animal increaſes in ſize, the circumvolutions of the ſhell increaſe alſo, until the number of thoſe volutes come to be five, which is never exceeded.

The part where the animal enlarges its ſhell is at the mouth, to which it adds in proportion as it finds itſelf ſtinted in its habitation below. Being about to enlarge its ſhell, it is ſeen with its little teeth biting and clearing away the ſcaly ſkin that grows at the edges. It is ſometimes ſeen to eat thoſe bits it thus takes off; at other times it only cleans away the margin when covered with films, and then adds another rim to its ſhell.

For the purpoſes of making the ſhell, which is natural to the animal, and without which it could not live three days, its whole body is furniſhed with glands, from the orifices of which flows out a kind of ſlimy fluid, like ſmall ſpiders' threads, which join together in one common cruſt or ſurface, and in time condenſe and acquire a ſtony hardneſs. It is this ſlimy humour that grows into a membrane, and afterwards a ſtony ſkin; nor can it have eſcaped any who have obſerved the tract of a ſnail, that gliſtening ſubſtance which it leaves on the floor or the wall, is no other than the materials with which the animal adds to its ſhell, or repairs it when broken.

Now to exhibit in a more ſatisfactory manner the method in which the ſhell is formed.—The ſnail burſts from its egg with its ſhell upon its back; this ſhell, though very ſimple, is the centre round which every ſucceeding convolution of the ſhell is formed, by new circles added to the firſt. As the body of the ſnail can be extended no where but to the aperture, the mouth of the ſhell only can of conſequence receive augmentation. The ſubſtance of which the ſhell is compoſed is chiefly ſupplied by the animal itſelf, and is no more than a ſlimy fluid which hardens into bone. This fluid paſſes through an infinite number of little glands till it arrives at the pores of the ſkin; but there it is ſtopped by the ſhell that covers the part below; and therefore is ſent to the mouth of the ſhell, where it is wanted for its enlargement. There the firſt layer of ſlime ſoon hardens; and then another is added, which hardens alſo, till in time the ſhell becomes as thick as is requiſite for the animal's preſervation. Thus every ſhell may be conſidered as compoſed of a number of layers of ſlime, which have entirely proceeded from the animal's own body.

But though this be the general opinion with regard to the formation of ſhells, I cannot avoid thinking there are ſtill other ſubſtances beſide the animal's own ſlime which go to the compoſition of its ſhell, or at leaſt to its external coat, which is ever different from the internal. The ſubſtances I mean are the accidental concretions of earthy or ſaline parts, which adhere to the ſlimy matter upon its firſt emiſſion. By adopting this theory, we can more ſatisfactorily account for the various colours of the ſhell, which cannot be ſuppoſed to take its tincture from the animal's body, as is the uſual opinion; for all the internal parts of the ſhell are but of one white colour; it is only the outermoſt layer of the ſhell that is ſo beautifully varied, ſo richly tinctured with that variety of colours we behold in the cabinets of the curious. If the external coat be ſcaled off, as Mr. Angenville aſſerts, all the inner ſubſtance will be found but of one ſimple colouring; and conſequently the animal's own juices can give only one colour; whereas we ſee ſome ſhells ſtained with a hundred.

The uſual way of accounting for the different colouring of ſhells, which ſeems to me erroneous, is this. In the body of every one of theſe animals, ſeveral ſtreaks are diſcerned of a different colour from the reſt. "This variety," ſay they, "is an inconteſtible proof that the juices flowing from thoſe parts will be alſo of a different hue; and will conſequently tinge that part of the ſhell which their ſlime compoſes of a different colour." But this ſyſtem, as was obſerved before, is overthrown by the fact, which diſcovers that only the outer ſurface of the ſhell is tinged; whereas, by this it would have been coloured throughout: nay, by this ſyſtem, the internal parts of the ſhell would be ſtained with the moſt vivid colouring, as being leaſt expoſed to the external injuries of the element where it is placed. But the truth is, the animal reſiding in the ſhell has none of theſe various colours thus talked of: its ſlime is a ſimple, pellucid ſubſtance; and the only marblings which appear in its body, are the colour of the food which is ſeen through its tranſparent inteſtines. We muſt, therefore, account for the various colouring of its ſhell upon a different principle.

If, as I ſaid, we examine the cabinets of the curious, we ſhall find ſhells with various and beautiful colouring; we ſhall find them generally furniſhed with a white ground, tinctured with red, yellow, brown, green, and ſeveral other ſhades and lovely mixtures, but never blue. Shells are of almoſt all colours but blue. The reaſon ſeems to be obvious; for blue is the colour which ſea-water changes. A piece of ſilk, or a feather, of this colour, put into an infuſion of ſalt, urine, or nitre, loſe their tint entirely. Now, may not this give us a hint with reſpect to the operation of Nature in colouring her ſhells? May we not from hence conclude, that ſea-water is efficacious in giving colour or taking it away? That, to produce colour, the animal not only furniſhes its juices, but the ſea or the earth that mixture of ſubſtance which is to unite with them. Neither the animal ſlime alone, nor the external earthy or ſaline ſubſtances alone, could produce colours; but both united, produce an effect which neither ſeparately were poſſeſſed of. Thus ſhells aſſume every colour but blue; and that ſea-water, inſtead of producing, would be apt to deſtroy.

From hence, therefore, it appears, that the animal does not alone tincture its own ſhell; but that external cauſes cooperate in contributing to its beauty. It is probable, that, from the nature of its food, or from other circumſtances unknown to us, the external layers of its ſlime may be of different conſiſtencies; ſo as, when joined with the particles of earth or ſalt that are accidentally united with them from without, they aſſume various and beautiful hues. But the internal layers, which receive no foreign admixture, ſtill preſerve the natural colour of the animal, and continue white without any variation.

Thus far we ſee that the animal is not wholly the agent in giving beauty and colouring to its ſhell: but it ſeems otherwiſe with reſpect to its convolutions, its prominences, and general form. Theſe entirely depend upon the art of the animal; or rather upon its inſtincts; which, in the ſame kinds, are ever invariable. The ſhell, generally, bears ſome rude reſemblance to the body upon which it has been moulded. Thus, it is obſervable in all ſea-ſhells, that if the animal has any tumour or excreſcence on its body, it creates likewiſe a ſwelling in that part of the incruſtation to which it correſponds. When the animal begins to alter its poſition, and to make new additions to its apartments, the ſame protuberance which had raiſed the ſhell before in one part, ſwells it again at ſome little diſtance; by which means we ſee the ſame inequality, in a ſpiral line, all round the ſhell. Sometimes theſe tumours of the animal are ſo large, or ſo pointed, that thoſe which riſe over them in the incruſtation, appear like horns: after this the animal diſengages itſelf from its firſt cavities, and then, by freſh evacuations, aſſumes a new ſet of horns; and ſo increaſes the number in proportion to its growth. If, on the other hand, the body happens to be channelled, the ſhell that covers it will be channelled likewiſe; if there be any protuberances in the body, which wind in a ſpiral line about it, the ſhell will likewiſe have its tumours and cavities winding round to the end.

In this manner, as the animals are of various forms, the ſhells exhibit an equal variety. Indeed, the diverſity is ſo great and the figures and colours ſo very ſtriking, that ſeveral perſons, with a kind of harmleſs indolence, have made the arrangement of them the ſtudy and the buſineſs of their lives. Thoſe who conſult their beauty alone, take care to have them poliſhed, and to have an external cruſt, or perioſteum, as Swammerdam calls it, ſcoured off from their ſurfaces by ſpirit of ſalt. But there are others that, with more learned affectation, keep them exactly in the ſtate in which they have been found, with their precious cruſt ſtill round them. The expence men have ſometimes been at in making ſuch collections, is amazing; and ſome ſhells, ſuch as the Stairs-ſhell or the Admiral-ſhell, are not more precious for their ſcarceneſs, than pearls are for their beauty. Indeed, it is the ſcarcity, and not the beauty of the object that determines the value of all natural curioſities. Thoſe ſhells that offer but little beautiful to the ignorant, are often the moſt precious; and thoſe ſhells which an unlearned ſpectator would ſtop to obſerve with admiration, one accuſtomed to the viſitation of cabinets, would paſs over with diſdain.—These collections, however, have their uſe; not only by exhibiting the vaſt variety of Nature's operations, but alſo by exciting our curioſity to the conſideration of the animals that form them. A mind that can find innocent entertainment in theſe humble contemplations is well employed; and, as we ſay of children, is kept from doing miſchief. Although there may be nobler occupations than that of conſidering the convolutions of a ſhell, yet there may be ſome who want the ambition to aſpire after ſuch arduous purſuits; there may be ſome unfit for them; there may be ſome who find their ambition fully gratified by the praiſe which the collectors of ſhells beſtow upon each other. Indeed, for a day or two, there is no mind that a cabinet of ſhells cannot furniſh with pleaſing employment. "What can be more gratifying," as Pliny ſays*, "than to view Nature in all her irregularities, and ſporting in her variety of ſhells! Such a difference of colour do they exhibit! ſuch a difference of figure! flat, concave, long, lunated, drawn round in a circle, the orbit cut in two! ſome are ſeen with a riſing on the back, ſome ſmooth, ſome wrinkled, toothed, ſtreaked, the point variouſly intorted, the mouth pointing like a dagger, folded back, bent inwards! all theſe variations, and many more, furniſh at once novelty, elegance, and ſpeculation."

With reſpect to the figure of ſhells, Ariſtotle has divided them into three kinds: and his method is, of all others, the moſt conformable to Nature. Theſe are, firſt, the *univalve*, or *turbinated*, which conſiſt of one piece, like the box of a ſnail; ſecondly, the *bivalve*, conſiſting of two pieces, united by a hinge, like an oyſter; and, thirdly, the *multivalve*, conſiſting of more than two pieces, as the acorn-ſhell, which has not leſs than twelve pieces that go to its compoſition. All theſe kinds are found in the ſea at different depths, and are valuable in proportion to their ſcarceneſs or beauty.

From the variety of the colours and figure of ſhells, we may paſs to that of their place and ſituation. Some are found in the ſea; ſome in freſh-water rivers; ſome alive upon land; and a ſtill greater quantity dead in the bowels of the earth. But wherever ſhells are found, they are univerſally known to be compoſed of one and the ſame ſubſtance. They are formed of an animal or calcarious earth, that ferments with vinegar and other acids, and that burns into lime, and will not eaſily melt into glaſs. Such is the ſubſtance of which they are compoſed; and of their ſpoils, many philoſophers think that a great part of the ſurface of the earth is compoſed at preſent. It is ſuppoſed by them, that chalks, marles, and all ſuch earths as ferment with vinegar, are nothing more than a compoſition of ſhells, decayed, and crumbled down to one uniform maſs.

Sea-ſhells are either found in the depths of the ocean, or they are caſt empty and forſaken of their animals upon ſhore. Thoſe which are fiſhed up from the deep, are called by the

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* Plin. IX. 33.

Latin name *Pelagii*; thoſe that are caſt upon ſhore, are called *Littorales*. Many of the pelagii are never ſeen upon ſhore; they continue in the depths where they are bred; and we owe their capture only to accident. Theſe, therefore, are the moſt ſcarce ſhells and conſequently the moſt valuable. The littorales are more frequent, and ſuch as are of the ſame kind with the pelagii are not ſo beautiful. As they are often empty and forſaken, and as their animal is dead, and perhaps putrid in the bottom of the ſhell, they by this means loſe the whiteneſs and the brilliancy of their colouring. They are not unfrequently alſo found eaten thro', either by worms or by each other; and they are thus rendered leſs valuable: but what decreaſes their price ſtill more is, when they are ſcaled and worn by lying too long empty at the bottom, or expoſed upon the ſhore. Upon the whole, however, ſea-ſhells exceed either land or foſſil ſhells in beauty; they receive the higheſt poliſh, and exhibit the moſt brilliant and various colouring.

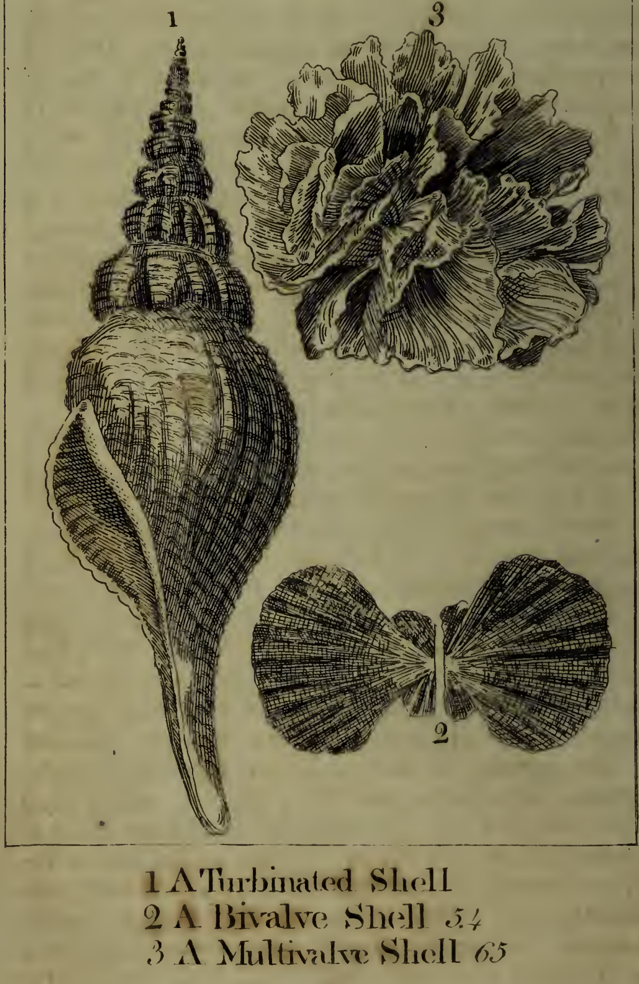
Freſh-water ſhells are neither ſo numerous, ſo various, nor ſo beautiful as thoſe belonging to the ſea. They want that ſolidity which the others have; their *clavicle*, as it is called, is neither ſo prominent nor ſo ſtrong; and not having a ſaline ſubſtance to tinge the ſurface of the ſhell, the colours are obſcure. In freſh-water there are but two kinds of ſhells, namely, the bivalved and the turbinated.

Living land-ſhells are more beautiful, though not ſo various as thoſe of freſh-water; and ſome not inferior to ſea-ſhells in beauty. They are, indeed, but of one kind, namely, the turbinated; but in that there are found four or five very beautiful varieties.

Of foſſil, or, as they are called, *extraneous* ſhells, found in the bowels of the earth, there are great numbers, and as great a variety. In this claſs there are as many kinds as in the ſea itſelf. There are found ther turbinated, the bivalve, and the multivative kinds; and of all theſe, many at preſent not to be fonnd even in the ocean. Indeed, the the number is ſo great, and the varieties ſo many, that it was long the opinion of naturaliſts, that they were merely the capricious productions of Nature, and had never given retreat to animals whoſe habitations they reſembled. They were found, not only of various kinds, but in different ſtates of preſervation: ſome had the ſhell entire, compoſed, as in its primitive ſtate, of a white calcarious earth, and filled with earth, or even empty; others were found with the ſhell entire, but filled with a ſubſtance which was petrified by time; others, and theſe in great numbers, were found with the ſhell entirely mouldered away, but the petrified ſubſtance that filled it ſtill exhibiting the figure of the ſhell; others ſtill, that had been lodged near earth or ſtone, impreſſed their print upon theſe ſubſtances, and left the impreſſion, though they themſelves were decayed: laſtly, ſome ſhells were found half mouldered away, their parts ſcaling off from each other in the ſame order in which they were originally formed. However, theſe different ſtages of the ſhell, and even their fermenting with acids, where at firſt inſufficent to convince thoſe who had beofre aſſigned them a different origin. They were ſtill conſidered as accidentally and ſportively formed, and depoſited in the various repoſitories where they were found, but no way appertaining to any part of Animated Nature. This put ſucceeding inquiries upon more minute reſearches; and they ſoon began to find, that often where they dug up petrified ſhells or teeth, they could diſcover the petrified remains of ſome other bony parts of the body. They found that the ſhells which were taken from the earth, exhibited the uſual defects and miſchances, which the ſame kind are known to receive at ſea. They ſhewed them not only tinctured with a ſalt-water cruſt, but pierced in a peculiar manner by the ſea worms, that make the ſhells of fiſhes their favourite food. Theſe demonſtrations were ſufficient at laſt to convince all but a few philoſophers who died away, and whoſe erroneous ſyſtems died with them.

Every ſhell, therefore, wherever it is found, is now conſidered as the ſpoil of ſome animal, that once found ſhelter therein. It matters not by what unaccountable means they may have wandered from the ſea; but they exhibit all, and the moſt certain marks of their origin. From their numbers and ſituation, we are led to conjecture, that the ſea reached the places where they are found; and from their varieties we learn how little we know of all the ſea contains at preſent; as the earth furniſhes many kinds which our moſt exact and induſtrious ſhell-collectors have not been able to fiſh up from the deep. It is moſt probable that thouſands of different forms ſtill remain at the bottom unknown; ſo that we may juſtly ſay with the philoſopher: *Ea quæ ſcimus ſunt pars minima eorum quæ ignoramus.*

It is well, however, for mankind, that the defect of our knowledge on this ſubject is, of all parts of learning, that which may be moſt eaſily diſpenſed with. An increaſe in the number of ſhells, would throw but very few lights upon the hiſtory of the animals that inhabit them. For ſuch information we are obliged to thoſe men who contemplated ſomething more than the outſide of the objects before them. To Reaumur we are obliged for examining the manners of ſome with accuracy; but to Swammerdam for more. In fact, this Dutchman has lent attention to thoſe animals, that almoſt exceeds credibility: he has excelled even the inſects he diſſected, in patience, induſtry, and perſeverance. It was in vain that this poor man's father diſſuaded him from what the world conſidered as a barren purſuit; it was in vain that an habitual diſorder, brought on by his application, interrupted his efforts; it was in vain that mankind treated him with ridicule while living, as they ſuffered his works to remain long unprinted and neglected when dead; ſtill the Dutch philoſopher went on, peeping into unwholeſome ditches, wading through fens, diſſecting ſpiders, and enumerating the blood-veſſels of a ſnail: like the bee, whoſe heart he could not only diſtinguiſh, but diſſect, he ſeemed inſtinctively impelled by his ruling paſſion, although he found nothing but ingratitude from man, and though his induſtry was apparently becoming fatal to himſelf. From him I will take ſome of the leading features in the hiſtory of thoſe animals which breed in ſhells; previouſly taking my diviſion from Ariſtotle, who, as was ſaid above, divides them into three claſſes: the Turbinated, or thoſe of the Snail kind; the Bivalved, or thoſe of the Oyſter Kind; and the Multivalved, or thoſe of the Acorn-ſhell Kind. Of each I will treat in diſtinct chapters.



1 A Turbinated Shell
2 A Bivalve Shell *54*
3 A Multivalve Shell *65*

CHAP. V.

OF TURBINATED SHELL-FISH OF THE SNAIL-KIND.

TO conceive the manner in which thoſe animals ſubſiſt that are hid from us at the bottom of the deep, we muſt again have recourſe to one of a ſimilar nature and formation, that we know. The hiſtory of the garden-ſnail has been more copiouſly conſidered than that of the elephant; and its anatomy is as well, if not better known: however, not to give any one object more room in the general picture of Nature than it is entitled to, it will be ſufficient to obſerve, that the ſnail is ſurpriſingly fitted for the life it is formed to to lead. It is furniſhed with the organs of life in a manner almoſt as complete as the largeſt animal; with a tongue, brain, ſalival ducts, glands, nerves, ſtomach, and inteſtines; liver, heart, and blood-veſſels: beſides this, it has a purple bag that furniſhes a red matter to different parts of the body, together with ſtrong muſcles that hold it to the ſhell, and which are hardened, like tendons, at their inſertion.

But theſe it poſſeſſes in common with other animals. We muſt now ſee what it has peculiar to itſelf. The firſt ſtriking peculiarity is, that the animal has got its eyes on the points of its largeſt horns. When the ſnail is in motion, four horns are diſtinctly ſeen; but the two uppermoſt and longeſt deſerve peculiar conſideration, both on account of the various motions with which they are endued, as well as their having their eyes fixed at the extreme ends of them. Theſe appear like two blackiſh points at their ends. When conſidered as taken out of the body, they are of a bulbous or turnip-like figure; they have but one coat; and the three humours which are common in the eyes of other animals, namely, the vitreous, the aqueous, and the cryſtalline, are in theſe very indiſtinctly ſeen. The eyes the animal can direct to different objects at pleaſure, by a regular motion out of the body; and ſometimes it hides them, by a very ſwift contraction into the belly. Under the ſmall horns is the animal's mouth; and though it may appear too ſoft a ſubſtance to be furniſhed with teeth, yet it has not leſs than eight of them, with which it devours leaves, and other ſubſtances, ſeemingly harder than itſelf; and with which it ſometimes bites off pieces of its own ſhell.

But what is moſt ſurpriſing in the formation of this animal, are the parts that ſerve for generation. Every ſnail is at once male and female; and while it impregnates another, is itſelf impregnated in turn. The veſſels ſupplying the fluid for this purpoſe, are placed chiefly in the fore part of the neck, and extend themſelves over the body; but the male and female organs of generation, are always found united, and growing together. There is a large opening on the right ſide of the neck, which ſerves for very different purpoſes. As an anus it gives a paſſage to the excrements; as a mouth it ſerves for an opening for a reſpiration; and alſo as an organ of generation, it dilates when the deſire of propagation begins. Within this each animal has thoſe parts, or ſomething ſimilar thereto, which continue the kind.

For ſome days before coition, the ſnails gather together, and lie quite near each other, eating very little in the mean time; but they ſettle their bodies in ſuch a poſture, that the neck and head are placed upright. In the mean time, the apertures on the ſide of the neck being greatly dilated, two organs, reſembling inteſtines, are ſeen iſſuing from them, which ſome have thought to be the inſtruments of generation. Beſide the protruſion of theſe, each animal is poſſeſſed of another peculiarity; for, from the ſame aperture, they launch forth a kind of dart at each other, which is pretty hard, barbed, and ending in a very ſharp point. This is performed when the apertures approach each other; and then the one is ſeen to ſhoot its weapon, which is received by the other, though it ſometimes falls to the ground; ſome minutes after, the ſnail which received the weapon, darts one of its own at its antagoniſt, which is received in like manner. They then ſoftly approach ſtill nearer, and apply their bodies one to the other, as cloſely as the palms and fingers of the hands, when graſped together. At that time the horns are ſeen variouſly moving in all directions; and this ſometimes for three days together. The coupling of theſe animals is generally thrice repeated, at intervals of fifteen days each; and, at every time, a new dart is mutually emitted.

At the expiration of eighteen days, the ſnails produce their eggs, at the opening of the neck, and hide them in the earth with the greateſt ſolicitude and induſtry. Theſe eggs are in great numbers, round, white, and covered with a ſoft ſhell: they are alſo ſtuck to each other by an imperceptible ſlime, like a bunch of grapes, of about the ſize of a ſmall pea.

When the animal leaves the egg, it is ſeen with a very ſmall ſhell on its back, which has but one convolution; but in proportion as it grows, the ſhell increaſes in the number of its circles. The ſhell always receives its additions at the mouth; the firſt centre ſtill remaining: the animal ſending forth from its body that ſlime which hardens into a ſtony ſubſtance, and ſtill is faſhioned into ſimilar volutions. The garden-ſnail ſeldom exceeds four rounds and an half; but ſome of the ſea-ſnails arrive even at ten.

The ſnail, thus fitted with its box, which is light and firm, finds itſelf defended in a very ample manner from all external injury. Whenever it is invaded, it is but retiring into this fortreſs, and waiting patiently till the danger is over. Nor is it poſſeſſed only of a power of retreating into its ſhell; but of mending it when broken. Sometimes theſe animals are cruſhed ſeemingly to pieces; and, to all appearance, utterly deſtroyed: yet ſtill they ſet themſelves to work, and, in a few days, mend all their numerous breaches. The ſame ſubſtance by which the ſhell is originally made, goes to the re-eſtabliſhment of the ruined habitation. But all the junctures are very eaſily ſeen, for they have a freſher colour than the reſt, and the whole ſhell in ſome meaſure reſembles an old coat, patched with new pieces. They are ſometimes ſeen with eight or ten of theſe patches; ſo that the damage muſt have been apparently irreparable. Still, however, though the animal is poſſeſſed of the power of mending its ſhell, it cannot, when come to its full growth, make a new one. Swammerdam tried the experiment: he ſtripped a ſnail of its ſhell, without hurting any of the blood-veſſels, retaining that part of the ſhell where the muſcles were inſerted; but it died in three days after it was ſtripped of its covering: not, however, without making efforts to build up a new ſhell; for, before its death, it preſſed out a certain membrane round the whole ſurface of its body. This membrane was entirely of the ſhelly nature, and was intended, by the animal, as a ſupply towards a new one.

As the ſnail is furniſhed with all the organs of life and ſenſation, it is not wonderful to ſee it very voracious. It chiefly ſubſiſts upon the leaves of plants and trees; but is very delicate in its choice. When the animal moves to ſeek its food, it goes forward by means of that broad muſcular ſkin which is ſometimes ſeen projecting round the mouth of the ſhell; this is expanded before, and then contracted with a kind of undulating motion, like a man attempting to move himſelf forward by one arm, while lying on his belly. But the ſnail has another advantage, by which it not only ſmooths and planes its way, but alſo can aſcend in the moſt perpendicular direction. This is by that ſlimy ſubſtance with which it is ſo copiouſly furniſhed, and which it emits wherever it moves. Upon this ſlime, as upon a kind of carpet, it proceeds ſlowly along, without any danger of wounding its tender body againſt the aſperities of the pavement; by means of this it moves upwards to its food upon trees; and by this deſcends without danger of falling, and breaking its ſhell by the ſhock.

The appetite of theſe animals is very great; and the damage gardeners in particular ſuſtain from them, makes them employ every method for their deſtruction. Salt will deſtroy them, as well as ſoot; but a tortoiſe in a garden is ſaid to baniſh them much more effectually.

At the approach of winter, the ſnail buries itſelf in the earth; or retires to ſome hole, to continue in a torpid ſtate, during the ſeverity of the ſeaſon. It is ſometimes ſeen alone; but more frequently in company in its retreat; ſeveral being uſually found together, apparently deprived of life and ſenſation. For the purpoſes of continuing in greater warmth and ſecurity, the ſnail forms a cover or lid to the mouth of its ſhell with its ſlime, which ſtops it up entirely, and thus protects it from every external danger. The matter of which the cover is compoſed, is whitiſh, ſomewhat like plaiſter, pretty hard and ſolid, yet at the ſame time porous and thin, to admit air, which the animal cannot live without. When the cover is formed too thick, the ſnail then breaks a little hole in it, which corrects the defect of that cloſeneſs, which proceeded from too much caution. In this manner, ſheltered in its hole from the weather, defended in its ſhell by a cover, it ſleeps during the winter; and, for ſix or ſeven months, continues without food or motion, until the genial call of ſpring breaks its ſlumber, and excites its activity.

The ſnail, having ſlept for ſo long a ſeaſon, wakes one of the firſt fine days of April, breaks open its cell, and ſallies forth to ſeek for nouriſhment. It is not ſurpriſing that ſo long a faſt ſhould have thinned it, and rendered it very voracious. At firſt, therefore, it is not very difficult in the choice of its food; almoſt any vegetable that is green ſeems welcome; but the ſucculent plants of the garden are chiefly grateful; and the various kinds of pulſe are, at ſome ſeaſons, almoſt wholly deſtroyed by their numbers. So great is the multiplication of ſnails at ſome years, that gardeners imagine they burſt from the earth. A wet ſeaſon is generally favourable to their production; for this animal cannot bear very dry ſeaſons, or dry places, as they cauſe too great a conſumption of its ſlime, without plenty of which it cannot ſubſiſt in health and vigour.

Such are the moſt ſtriking particulars in the hiſtory of this animal; and this may ſerve as a general picture, to which the manners and habitudes of the other tribes of this claſs may be compared and referred. Theſe are, the ſea ſnail, of which naturaliſts have, from the apparent difference of their ſhells, mentioned fifteen kinds*; the freſh-water ſnail, of which there are eight kinds; and the land-ſnail, of which there are five. Theſe all bear a ſtrong reſemblance to the garden-ſnail, in the formation of their ſhell, in their hermaphrodite natures, in the ſlimy ſubſtance with which they are covered, in the formation of their inteſtines, and the diſpoſition of the hole on the right ſide of the neck, which ſerves at once for the diſcharge of the fæces, for the lodging the inſtruments of generation, and for reſpiration, when the animal is under a neceſſity of taking in a new ſupply.

But in Nature, no two kinds of animals, however, like each other in figure or conformation, are of manners entirely the ſame. Tho' the common garden-ſnail bears a very ſtrong reſemblance to that of freſh-water, and that of the ſea, yet there are differences to be found, and thoſe very conſiderable ones.

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* D'Argenville's Conchylioligie.

If we compare them with the freſh-water ſnail, tho' we we ſhall find a general reſemblance, yet there are one or two remarkable diſtinctions: and firſt, the freſh-water ſnail, and, as I ſhould ſuppoſe, all ſnails that live in water, are peculiarly furniſhed with a contrivance by Nature, for riſing to the ſurface, or ſinking to the bottom. The manner in which this is performed, is by opening and ſhutting the orifice on the right ſide of the neck, which is furniſhed with muſcles for that purpoſe. The ſnail ſometimes gathers this aperture into an oblong tube, and ſtretches or protends it above the ſurface of the water, in order to draw in or expel the air, as it finds occaſion. This may not only be ſeen, but heard alſo by the noiſe which the ſnail makes in moving the water. By dilating this it riſes, by compreſſing it the animal ſinks to the bottom. This is effected ſomewhat in the manner in which little images of glaſs are made to riſe or ſink in water, by preſſing the air contained at the mouth of the tubes, ſo that it ſhall drive the water into their hollow bodies, which before were filled only with air, and thus make them heavier than the element in which they ſwim. In this manner does the freſh-water ſnail dive or ſwim, by properly managing the air contained in its body.

But what renders theſe animals far more worthy of notice is, that they are viviparous, and bring forth their young not only alive, but with their ſhells upon their backs. This ſeems ſurpriſing: yet it is inconteſtably true! the young come to ſome degreee of perfection in the womb of the parent; there they receive their ſtony coat; and from thence are excluded, with a complete apparatus for ſubſiſtence.

"On the twelfth of March," ſays Swammerdam, "I began my obſervations upon this ſnail, and collected a great number of the kind, which I put into a large baſon filled with rain-water, and fed for a long time with potter's earth, diſſolved in the water about them. On the thirteenth of the ſame month I opened one of theſe ſnails, when I found nine living ſnails in its the womb: the largeſt of theſe were placed foremoſt, as the firſt candidates for excluſion. I put them into freſh-water, and they lived till the eighteenth of the ſame month, moving and ſwimming, like ſnails full grown:

nay, their manner of ſwimming was much more beautiful." Thus, at whatever time of the year theſe ſnails are opened, they are found pregnant with eggs, or with living ſnails; or with both together.

This ſtriking difference between the freſh-water and the garden-ſnail, obtains alſo in ſome of the ſea-kind; among which there are ſome that are found viviparous, while others lay eggs in the uſual manner. Of this kind are one or two of the Buccinums; within which living young have been frequently found, upon their diſſection. In general, however, the reſt of this numerous claſs bring forth eggs; from whence the animal burſts at a proper ſtate of maturity, completely equipped with a houſe, which the moiſtneſs of the element where it reſides does not prevent the inhabitant from enlarging. How the ſoft ſlime of the ſnail hardens, at the bottom of the ſea, into the ſtony ſubſtance of a ſhell, is not eaſy to conceive! This ſlime muſt at leaſt be poſſeſſed of very powerful petrifying powers.

All animals of the ſnail kind, as was obſerved before, are hermaphrodites; each containing the inſtruments of generation double. But ſome of the ſea kinds copulate in a different manner from thoſe of the garden. The one impregnates the other; but, from the poſition of the parts, is incapable of being impregnated by the ſame in turn. For this reaſon it is neceſſary for a third to be admitted as a partner in this operation: ſo that, while one impregnates that before it, another does the ſame office by this; which is itſelf impregnated by a fourth. In this manner, Mr. Adanſon has ſeen vaſt numbers of ſea-ſnails united together in a chain, impregnating each other. The Bulin and the Coret perform the offices of male and female at the ſame time. The orifices in theſe are two, both ſeparate from each other: the opening by which the animal performs the office of the male, being at the orign of the horns; that by which it is paſſive, as the female, being farther down upon the neck. It may alſo be obſerved as a general rule, that all animals that have this orifice, or verge, as ſome call it, on the right ſide, have their ſhells turned from the right to the left; on the contrary, thoſe which have it on the left ſide, have their ſhells turned from left to right, in a contrary direction to the former.

But this is not the only difference between land and ſea-ſnails. Many of the latter entirely want horns; and none of them have above two. Indeed, if the horns of ſnails be furniſhed with eyes, and if, as ſome are willing to think, the length of the horn, like the tube of a teleſcope, aſſiſts viſion, theſe animals that chiefly reſide in the gloomy bottom of the deep, can have no great occaſion for them. Eyes would be unneceſſary to creatures whoſe food is uſually concealed in the darkeſt places; and who, poſſeſſed of very little motion, are obliged to grope for what they ſubſiſt on. To ſuch, I ſay, eyes would rather be an obſtruction than an advantage; and, perhaps, even thoſe that live upon land are without them.

Thoſe that have ſeen the ſhells of ſea-ſnails, need not be told, that the animal which produces them is larger than thoſe of the ſame denomination upon land. The ſea ſeems to have the property of enlarging the magnitude of all its inhabitants; and the ſame proportion that a trout bears to a ſhark, is often ſeen to obtain between a ſhell bred upon the land, and one bred in the ocean. Its convolutions are more numerous. The garden-ſnail has but five turns at the moſt; in the ſea-ſnail the convolutions are ſometimes ſeen amounting to ten.

There is a difference alſo in the poſition of the mouth, in the garden and the water-ſnail. In the former, the mouth is placed croſswiſe, as in quadrupeds; furniſhed with jaw-bones, lips, and teeth. In moſt of the ſea-ſnails, the mouth is placed longitudinally in the head; and in ſome obliquely, or on one ſide. Others, of the Trochus kind, have no mouth whatſoever; but are furniſhed with a trunk, very long in ſome kinds and ſhorter in others.

Snails of the Trochus kind, furniſhed thus with an inſtrument of offence, deſerve our particular attention. The trunk of the Trochus is fleſhy, muſcular, ſupple, and hollow. Its extremity is bordered with a cartilage, and toothed like a ſaw. The ſnails that are provided with this, may be conſidered as the predacious tribe among their fellows of the bottom. They are among ſnails, what the tiger, the eagle, or the ſhark is among beaſts, birds, or fiſhes. The whole race of ſhelled animals avoid their approach; for their habitations, however powerfully and ſtrongly built, though never ſo well fortified, yield to the ſuperior force of theſe invaders. Though provided with a thick, clumſy ſhell themſelves, yet they move with greater ſwiftneſs at the bottom than moſt other ſhell-fiſh, and ſeize their prey with greater facility. No ſhell ſo large but they will boldly venture to attack; and, with their piercing augre-like trunk, will quickly bore it through. No efforts the other animal makes can avail: it expands itſelf, and riſes to the ſurface; but the enemy riſes with it: it again ſinks to the bottom, but ſtill its deſtroyer cloſely adheres. In this manner the carnivorous ſhell-fiſh, as ſome naturaliſts call it, ſticks for ſeveral days, nay weeks to its prey, until, with its trunk, it has ſucked out all ſubſtance, or until it drops off when the other begins to putrefy.

Thus it would ſeem throughout Nature, that no animal is ſo well defended, but that others are found capable of breaking in upon its entrenchments. The garden-ſnail ſeems tolerably well guarded; but the wall of its ſhell is paper itſelf, in compariſon with that which fortifies ſome of the ſea-ſnail kind. Beſide this thick ſhell, many of them are alſo furniſhed with a lid, which covers the mouth of the ſhell, and which opens and ſhuts at the animal's pleaſure. When the creature hunts for food, it opens its box, gropes or ſwims about; and, when ſatisfied, drops its lid, and ſinks to the bottom: there it might be ſuppoſed to remain in perfect ſecurity; but the trochus ſoon finds the way to break into the thickeſt part of its incloſure, and quickly deſtroys it with the moſt fatal induſtry.

The being liable to the attacks of the trochus ſeems to be a calamity to which moſt of this tribe are ſubject. Scarce a ſhell is met with entire and ſound to the end of its convolutions; but particularly the thinneſt ſhells are the moſt ſubject to be thus invaded. As their ſhells are eaſily pierced, the predatory ſhell-fiſh, or the ſea-worm, chiefly ſeek them for ſubſiſtence; and of thoſe thin, paper-like ſhells, not one in a hundred is found that has not ſuffered ſome diſaſter. As they are lighter than other ſhell-fiſh, they ſwim with greater eaſe; and this is the chief method of avoiding their heavier thick-ſhelled purſuers. The food of all ſnails properly lies at the bottom; when, therefore, the nautilus, or other thin-ſhelled fiſh, are ſeen buſily ſwimming at the ſurface, it may be, that, inſtead of ſporting or ſunning themſelves, as ſome are apt to ſuppoſe, they are actually labouring to eſcape their moſt deadly purſuers.

Of all ſea-ſnails, that which is moſt frequently ſeen ſwimming upon the ſurface, and whoſe ſhell is the thinneſt and moſt eaſily pierced, is the nautilus. Whether upon theſe occaſions, it is employed in eſcaping its numerous enemies at the bottom, or ſeeking for food at the ſurface, I will not venture to decide. It ſeems moſt probable, that the former is the cauſe of its frequently appearing; for, upon opening the ſtomach, it is found to contain chiefly that food which it finds at the bottom. This animal's induſtry, therefore, may be owing to its fears; and all thoſe arts of ſailing which it has taught mankind, may have been originally the product of neceſſity. But the nautilus is too famous not to demand a more ample deſcription. Although there be ſeveral ſpecies of the nautilus, yet they all may be divided into two: the one with a white ſhell, as thin as paper, which it is often ſeen to quit, and again to reſume; the other with a thicker ſhell, ſometimes of a beautiful mother-of-pearl colour, and that quits its ſhell but rarely. This ſhell outwardly reſembles that of a large ſnail, but is generally ſix or eight inches acroſs: within it is divided into forty partitions, that communicate with each other by doors, if I may ſo call them, through which one could not thruſt a gooſe-quill: almoſt the whole internal part of the ſhell is filled by the animal; the body of which, like its habitation, is divided into as many parts as there are chambers in its ſhell: all the parts of its body communicate with each other, through the doors or openings, by a long blood-veſſel, which runs from the head to the tail: thus the body of the animal, if taken out of the ſhell, may be likened to a number of ſoft bits of fleſh, of which there are forty threaded upon a ſtring. From this extraordinary conformation, one would not be apt to ſuppoſe that the nautilus ſometimes quitted its ſhell, and returned to it again; yet nothing, though ſeemingly more impoſſible, is more certain. The manner by which it contrives to diſengage every part of its body from ſo intricate a habitation; by which it makes a ſubſtance to appearance as thick as one's wriſt, paſs through forty doors, each of which would ſcarcely admit a gooſe-quill, is not yet diſcovered; but the fact is certain; for the animal is often found without its ſhell; and the ſhell more frequently deſtitute of the animal. It is moſt probable, that it has a power of making the ſubſtance of one ſection of its body remove up into that which is next; and thus, by multiplied removals it gets free.

But this, though very ſtrange, is not the peculiarity for which the nautilus has been the moſt diſtinguiſhed. Its "ſpreading the thin oar," and "catching the flying-gale," to uſe the poet's deſcription of it, has chiefly excited human curioſity. Theſe animals, particularly thoſe of the white, light kind, are chiefly found in the Mediterranean; and ſcarce any who have ſailed on that ſea, but muſt often have ſeen them. When the ſea is calm, they are obſerved floating on the ſurface; ſome ſpreading their little ſail; ſome rowing with their feet, as if for life and death; and others ſtill, floating upon their mouths, like a ſhip with the keel upward. If taken while thus employed, and examined, the extraordinary mechaniſm of their limbs for ſailing will appear more manifeſt. The nautilus is furniſhed with eight feet, which iſſue near the mouth, and may as properly be called barbs: theſe are connected to each other by a thin ſkin, like that between the toes of a duck, but much thinner and more tranſparent. Of theſe eight feet thus connected, ſix are ſhort, and theſe are held up as ſails to catch the wind in ſailing: the two others are longer, and are kept in the water; ſerving, like paddles, to ſteer their courſe by. When the weather is quite calm, and the animal is purſued from below, it is then ſeen expanding only a part of its ſail, and rowing with the reſt: whenever it is interrupted, or fears danger from above, it inſtantly furls the ſail, catches in all its oars, turns its ſhell-mouth downward, and inſtantly ſinks to the bottom. Sometimes, alſo, it is ſeen pumping the water from its leaking hulk; and, when unfit for ſailing, deſerts its ſhell entirely. The forſaken hulk is ſeen floating along, till it daſhes, by a kind of ſhipwreck, upon the rocks or the ſhore.

From the above deſcription, I think we may conſider this animal rather as attempting to ſave itſelf from the attacks of its deſtroyers, than as rowing in purſuit of food. Certain it is, that no creature of the deep has more numerous and more powerful enemies. Its ſhell is ſcarcely ever found in perfect preſervation; but is generally ſeen to bear ſome marks of hoſtile invaſion. Its little arts, therefore, upon the ſurface of the water, may have been given it for protection; and it may thus endued with comparative ſwiftneſs to avoid the crab, the ſea-ſcorpion, the trochus, and all the ſlower predacious reptiles that lurk for it at the bottom of the water.

From this general view of ſnails, they appear to be a much more active, animated tribe, than from their figure one would at firſt conceive. They ſeem to an inattentive ſpectator, as mere inert maſſes of ſoft fleſh, rather loaded than covered with a ſhell, ſcarcely capable of motion, and inſenſible to all the objects around them. When viewed more cloſely, they are found to be furniſhed with the organs of life and ſenſation in a tolerable perfection: they are defended with armour, that is at once both light and ſtrong; they are as active as their neceſſities require; and are poſſeſſed of appetites more poignant than thoſe of animals that ſeem much more perfectly formed. In ſhort, they are a fruitful, induſtrious tribe; furniſhed, like all other animals, with the powers of eſcape and invaſion; they have their purſuits and their enmities; and, of all creatures of the deep, they have moſt to fear from each other.

CHAP. VI.

OF BIVALVED SHELL-FISH, OR SHELLS OF THE OYSTER KIND.

IT may ſeem whimſical to make a diſtinction between the animal perfections of turbinated and bivalved ſhell-fiſh; or to grant a degree of ſuperiority to the ſnail above the oyſter. Yet this diſtinction ſtrongly and apparently obtains in Nature; and we ſhall find the bivalved tribe of animals in every reſpect inferior to thoſe we have been deſcribing. Inferior in all their ſenſations; inferior in their powers of motion; but particularly inferior in their ſyſtem of animal generation. The ſnail tribe, as we ſaw, are hermaphrodite, but require the aſſiſtance of each other for fecundation; all the bivalve tribe are hermaphrodite in like manner, but they require no aſſiſtance from each other towards impregnation; and a ſingle muſcle or oyſter, if there were no other in the world, would quickly repleniſh the ocean. As the land-ſnail from its being beſt known, took the lead in the former claſs, ſo the freſh-water muſcle, for the ſame reaſon, may take lead in this. The life and manners of ſuch as belong to the ſea will be beſt diſplayed in the compariſon.

The muſcle, as is well known, whether belonging to freſh or ſalt-water, conſiſts of two equal ſhells, joined at the back by a ſtrong, muſcular ligament that anſwers all the purpoſes of a hinge. By the elaſtic contraction of theſe the animal can open its ſhell at pleaſure, about a quarter of an inch from each other. The fiſh is fixed to either ſhell by four tendons, by means of which it ſhuts them cloſe, and keeps its body firm from being cruſhed by any ſhock againſt the walls of its own habitation. It is furniſhed, like all other animals of this kind, with vital organs, though theſe are ſituated in a very extraordinary manner. It has a mouth furniſhed with two fleſhy lips; its inteſtine begins at the bottom of the mouth, paſſes through the brain, and makes a number of circumvolutions through the liver; on leaving this organ, it goes on ſtraight into the heart, which it penetrates, and ends in the anus; near which the lungs are placed, and through which it breathes, like thoſe of the ſnail kind; and in this manner its languid circulation is carried on*.

But the organs of generation are what moſt deſerve to excite our curioſity. Theſe conſiſt in each muſcle of two ovaries, which are the female part of its furniture, and of two ſeminal veſſels, reſembling what are found in the male.— Each ovary and each ſeminal veſſel has its own proper canal; by the ovary-canal the eggs deſcend to the anus; and there, alſo, the ſeminal-canals ſend their fluids to impregnate them. By this contrivance, one ſingle animal ſuffices for the double purpoſes of generation; and the eggs are excluded and impregnated by itſelf alone.

As the muſcle is thus furniſhed with a kind of ſelf-creating power, there are few places where it breeds, that it is not found in great abundance. The ovaries uſually empty themſelves of their eggs in ſpring, and they are repleniſhed in autumn. For this reaſon they are found empty in ſummer and full in winter. They produce in great numbers, as all bivalved ſhell-fiſh are found to do. The fecundity of the ſnail kind is trifling in compariſon to the fertility of theſe. Indeed it may be aſſerted as a general rule in Nature, that the more helpleſs and contemptible the animal, the more prolific it is always found. Thus all creatures that are incapable of reſiſting their deſtroyers, have nothing but their quick multiplication, for the continuation of their exiſtence.

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* M. Mery. Anat. de Moules d'Etang.

The multitude of theſe animals in ſome places is very great; but, from their defenceleſs ſtate, the number of their deſtroyers are in equal proportion. The crab, the cray-fiſh, and many other animals, are ſeen to devour them; but the trochus is their moſt formidable enemy. When their ſhells are found deſerted, if we then obſerve cloſely, it is moſt probable we ſhall find that the trochus has been at work in piercing them. There is ſcarce one of them without a hole in it; and this probably was the avenue by which the enemy entered to deſtroy the inhabitant.

But notwithſtanding the number of this creature's animated enemies, it ſeems ſtill more fearful of the agitations of the element in which it reſides; for if daſhed againſt rocks, or thrown far on the beach, it is deſtroyed without a power of redreſs. In order to guard againſt theſe, which are to this animal the commoneſt and the moſt fatal accidents, although it has a power of ſlow motion, which I ſhall preſently deſcribe, yet it endeavours to become ſtationary, and to attach itſelf to any fixed object it happens to be near. For this purpoſe it is furniſhed with a very ſingular capacity of binding itſelf by a number of threads to whatever object it approaches; and theſe Reaumur ſuppoſed it ſpun artifically, as ſpiders their webs which they faſten againſt a wall. Of this, however, later philoſophers have found very great reaſon to doubt. It is therefore ſuppoſed that theſe threads which are uſually called the beard of the muſcle, are the natural growth of the animal's body, and by no means produced at pleaſure. Indeed, the extreme length of this beard in ſome, which far exceeds the length of the body, ſeems impoſſible to be manufactured by the thruſting out and drawing in of the tongue, with the glutinous matter of which the French philoſopher ſuppoſed thoſe threads were formed. It is even found to increaſe with the growth of the animal; and as the muſcle becomes larger and older, the beard becomes longer and its filaments more ſtrong*. Be this as it will, nothing is more certain than that the muſcle is found attached by theſe threads to every fixed object; ſometimes, indeed, for want of ſuch an object, theſe animals are found united to each other; and though thrown into a lake ſeparately, they are taken out in bunches of many together.

To have ſome fixed reſting place where the muſcle can continue, aud take in its accidental food, ſeems the ſtate that this animal chiefly deſires. Its inſtrument of motion, by which it contrives to reach the object it wants to bind itſelf to, is that muſcular ſubſtance reſembling a tongue, which is found long in proportion to the ſize of the muſcle. In ſome it is two inches long, in others not a third part of theſe dimenſions. This the animal has a power of thruſting out of its ſhell; and with this it is capable of making a ſlight furrow in the ſand at the bottom. By means of this furrow it can erect itſelf upon the edge of its ſhell; and thus continuing to make the furrow in proportion as it goes forward, it reaches out its tongue, that anſwers the purpoſe of an arm, and thus carries its ſhell edge-ways, as in a grove, until it reaches the point intended. There, where it determines to take up its reſidence, it fixes the ends of its beard which are glutinous, to the rock or the object, whatever it be; and thus, like a ſhip at anchor, braves all the agitations of the water. Sometimes the animal is attached by a large number of threads; ſometimes but by three or four, that ſeem ſcarce able to retain it. When the muſcle is fixed in this manner, it lives upon the little earthy particles that the water tranſports to its ſhells, and perhaps the fleſh of the moſt diminutive animals. However, is does not fail to grow conſiderably; and ſome of this kind have been found a foot long. I have ſeen the beards a foot and a half;

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* Mercier du Paty, ſur le bouchots à moules. Tom. ii. de l'Academie de la Rochelle.

and of this ſubſtance the natives of Palermo ſometimes make gloves and ſtockings.

Theſe ſhell-fiſh are found in lakes, rivers, and in the ſea. Thoſe of the lake often grow to a very large ſize; but they ſeem a ſolitary animal, and are found generally ſeparate from each other. Thoſe of rivers are not ſo large, but yet in greater abundance; but the ſea-muſcle of all others is perhaps the moſt plenty. Theſe are often bred artificially in ſalt-water marſhes that are overflowed by the tide; the fiſhermen throwing them in at the proper ſeaſons; and there being undiſturbed by the agitations of the ſea, and not preyed upon by their powerful enemies at the bottom, they caſt their eggs, which ſoon become perfect animals, and theſe are generally found in cluſters of ſeveral dozens together. It requires a year for the peopling a muſcle-bed; ſo that, if the number conſiſts of forty thouſand, a tenth part may annually be left for the peopling the bed anew. Muſcles are taken from their beds from the month of July to October; and they are ſold at a very moderate price.

From this animal the oyſter differs very little, except in the thickneſs of its ſhell, and its greater imbecility. The oyſter, like the muſcle, is formed with organs of life and reſpiration, with inteſtines which are very voluminous, a liver, lungs, and heart. Like the muſcle, it is ſelf-impregnated; and the ſhell, which the animal ſoon acquires, ſerves it for its future habitation. Like the muſcle, it opens its ſhell to receive the influx of water; and like that animal is ſtrongly attached to its ſhells both above and below.

But it differs in many particulars. In the firſt place its ſhells are not equal, the one being cupped, the other flat; upon the cupped ſhell it is always ſeen to reſt; for if it lay upon the flat ſide it would then looſe all its water. It differs alſo in the thickneſs of its ſhells, which are ſo ſtrongly lined and defended, that no animal will attempt to pierce them. But though the oyſter be ſecured from the attacks of the ſmall reptiles at the bottom, yet it often ſerves as an object to which they are attached. Pipe-worms and other little animals fix their habitation to the oyſter's ſides, and in this manner continue to live in ſecurity. Among the number of theſe is a little red worm, that is often found upon the ſhell; which ſome, from never ſeeing oyſters copulate, erroneouſly ſuppoſed to be the male by which their ſpawn was impregnated.

The oyſter differs alſo from the muſcle in being utterly unable to change its ſituation. The muſcle, as we have obſerved, is capable of erecting itſelf on an edge, and going forward with a ſlow laborious motion. The oyſter is wholly paſſive, and endeavours by all its powers to reſt fixed to one ſpot at the bottom. It is entirely without that tongue which we ſaw anſwering the purpoſes of an arm in the other animal; but nevertheleſs is often attached very firmly to any object it happens to approach. Rocks, ſtones, pieces of timber, or ſea-weeds, all ſeem proper to give it a fixture, and to ſecure it againſt the agitation of the waves. Nothing ſo common in the rivers of the tropical climates as to ſee oyſters growing even amidſt the branches of the foreſt.—Many trees which grow along the banks of the ſtream often bend their branches into the water, and particularly the mangrove, which chiefly delights in a moiſt ſituation. To theſe the oyſters hang in cluſters, like apples upon the moſt fertile tree; and in proportion as the weight of the fiſh ſinks the plant into the water, where it ſtill continues growing, the number of oyſters increaſe, and hang upon the branches. Thus there is nothing that theſe ſhell fiſh will not ſtick to; they are often even found to ſtick to each other. This is effected by means of a glue proper to themſelves, which, when it cements, the joining is as hard as the ſhell, and is as difficulty broken. The joining ſubſtance, however, is not always of glue; but the animal grows to the rocks, ſomewhat like the muſcle, by threads; although theſe are only ſeen to take root in the ſhell, and not, as in the muſcle, to ſpring from the body of the fiſh itſelf.

Oyſters uſually caſt their ſpawn in May, which at firſt appear like drops of candle-greaſe, and ſtick to any hard ſubſtance they fall upon. Theſe are covered with a ſhell in two or three days; and in three years the animal is large enough to be brought to market. As they invariably remain in the places where they are laid, and as they grow without any other ſeeming food than the afflux of ſea-water, it is the cuſtom at Colcheſter, and other parts of the kingdom, where the tide ſettles in marſhes on land, to pick up great quantities of ſmall oyſters along the ſhore, which when firſt gathered ſeldom exceed the ſize of a ſixpence. Theſe are depoſited in beds where the tide comes in, and in two or three years grow to a tolerable ſize. They are ſaid to be better taſted for being thus ſheltered from the agitations of the deep; and a mixture of freſh water entering into theſe repoſitories, is ſaid to improve their flavour, and to increaſe their growth and fatneſs.

The oyſters, however, which are prepared in this manner, are by no means ſo large as thoſe found ſticking to rocks at the bottom of the ſea, uſually called *rock-oyſters*. Theſe are ſometimes found as broad as a plate, and are admired by ſome as excellent food. But what is the ſize of theſe compared to the oyſters of the Eaſt Indies, ſome of whoſe ſhells I have ſeen two feet over! The oyſters found along the coaſt of Coromandel are capable of furniſhing a plentiful meal to eight or ten men; but it ſeems univerſally agreed that they are no way comparable to ours for delicacy or flavour.

Thus the muſcle and the oyſter appear to have but few diſtinctions except in their ſhape and the power of motion in the former. Other bivalved ſhell-fiſh, ſuch as the cockle, the ſcallop, and the razor-ſhell, have differences equally minute. The power of changing place, which ſome of them effect in a manner quite peculiar to themſelves, makes their greateſt difference. The ſcallop is particularly remarkable for its method of moving forward upon land, or ſwimming upon the ſurface of the water. When this animal finds itſelf deſerted by the tide, it makes very remarkable efforts to regain the water, moving towards the ſea in a moſt ſingular manner. It firſt gapes with its ſhell as widely as it can, the edges being often an inch aſunder; then it ſhuts them with a jerk, and by this the whole animal riſes five or ſix inches from the ground. It thus tumbles any how forward, and then renews the operation until it has attained its journey's end. When in the water it is capable of ſupporting itſelf upon the ſurface; and there opening and ſhutting its ſhells, it tumbles over and over, and makes its way with ſome celerity.

The Pivot or razor-ſhell has a very different kind of motion. As the former moves laboriouſly and ſlowly forward, ſo the razor-ſhell has only a power of ſinking point downward. The ſhells of this animal reſemble nothing ſo much as the haft of a razor; and by this form it is better enabled to dive into the ſoft ſand at the bottom. All the motions of this little animal are confined to ſinking or riſing a foot downwards or upwards in the ſand, for it never leaves the ſpot where firſt it was planted. From time to time it is ſeen to riſe about half way out of its hole; but if any way diſturbed, it ſinks perpendicularly down again. Juſt over the place where the razor buries itſelf, there is a ſmall hole like a chimney, through which the animal breathes, or imbibes the ſea-water. Upon the deſertion of the tide, theſe holes are eaſily diſtinguiſhed by the fiſhermen who ſeek for it; and their method of enticing the razor up from the depth of its retreat is by ſprinkling a little ſea-ſalt upon the hole. This melting no ſooner reaches the razor below than it riſes inſtantly ſtraight upwards, and ſhews about half its length above the ſurface. This appearance, however, is inſtantaneous; and if the fiſher does not ſeize the opportunity, the razor buries itſelf with great eaſe to its former depth.—There it continues ſecure; no ſalt can allure it a ſecond time; but it remains unmoleſted, unleſs the fiſher will be at the trouble of digging it out ſometimes two feet below the ſurface.

Such are the minute differences between bivalved ſhell-fiſh; but in the great out-lines of their nature they exactly reſemble each other. It is particularly in this claſs of ſhell-fiſh that pearls are found in great abundance; and it is in the internal parts of thoſe ſhells that are of a ſhining ſilvery colour that theſe gems are uſually generated; but the pearl is alſo found to breed as well in the muſcle or the ſcallop as in the oyſter. In fact it is found in all bivalled ſhells, the inſides of which reſemble that well-known ſubſtance called mother-of-pearl.

Whether pearls be a diſeaſe or an accident in the animal is ſcarcely worthy inquiry. The common opinion is, that they are a kind of calculus concretion in the body of the animal, ſomewhat reſembling a ſtone in the bladder, and are conſequently to be conſidered as a diſorder. It is ſaid, in confirmation of this opinion, that thoſe coaſts upon which pearls are fiſhed, are very unhealthy; and therefore moſt probably oyſters ſhare the general influence of the climate; it is alſo added that thoſe oyſters in which pearls are found are always ill-taſted, which is a ſign of their being unſound; and laſtly, it is aſſerted that the pearl grows ſometimes ſo big as to keep the ſhells of the animal from ſhutting, and that thus it dies by being expoſed. It is eaſy to ſee the weakneſs of theſe aſſertions, which ſeem neither true nor amuſing. To anſwer them in their own way: If a ſtone in the bladder be a diſorder, a ſtone in the ſtomach of an oſtrich is a benefit, and ſo it may be in the ſhell of an oyſter. If the ſhores where the pearls are fiſhed be unwholeſome to man, that, inſtead of being diſadvantageous, is ſo much the more lucky for the oyſter. If the pearl oyſters are the worſt taſted, ſo are kites and ravens among birds; and yet we know that they are healthy and long-lived animals: if the oyſter had ever its ſhell kept aſunder by the pearl within it, that would be a diſeaſe indeed: but this, in reality, never happens; for the oyſter that breeds a large pearl always breeds a large ſhell, and the ſhell itſelf indents to receive its impreſſion. The pearl upon the whole ſeems bred from no diſorder in the animal, but accidentally produced by the ſame matter that goes to form the ſhell. The ſubſtance, which is ſoft at firſt, quickly hardens; and thus, by ſucceſſive coats, layer over layer, the pearl acquires its dimenſions. If cut through, it will be found to conſiſt of ſeveral coats, like an onion; and ſometimes a ſmall ſpeck is ſeen in the middle, upon which the coats were originally formed.

All oyſters, and moſt ſhell-fiſh, are found to contain pearls; but that which particularly obtains the name of the pearl oyſter, has a large ſtrong whitiſh ſhell, wrinkled and rough without, and within ſmooth and of a ſilver colour. From theſe the mother-of-pearl is taken, which is nothing more than the internal coats of the ſhell, reſembling the pearl in colour and conſiſtence. This is taken out and ſhaped into the variety of utenſils which are found ſo beautiful; but the pearl itſelf is chiefly prized; being found but in few oyſters, and generally adhering, ſometimes making a print in the body of the ſhell, ſometimes at large within the ſubſtance of the fiſh.

There are a great number of pearl fiſheries in America and Aſia; but as pearls bear a worſe price than formerly, thoſe of America are in a great meaſure diſcontinued. The moſt famous of all the Aſiatic fiſheries is in the Perſian Gulph, near the Iſle of Bahren. There is another between the coaſt of Madura and the Iſland of Ceylon; and there was a third on the coaſts of Japan: but as theſe noble iſlanders have a contempt for jewels, and an abhorrence for ſuch Europeans as come in purſuit of them, that fiſhery which is thought to be the moſt valuable of all others, is diſcontinued. The diving buſineſs is now carried on only in thoſe countries where the wretchedneſs of one part of mankind goes to ſupport the magnificence of the other.

The chief fiſhery, as was ſaid, is carried on in the Perſian Gulph, and the moſt valuable pearls are brought from thence. The value of theſe jewels increaſes not only in proportion to their ſize, but alſo their figure and colour; for ſome pearls are white, others are yellowiſh, others of a lead colour; and ſome affirm they have been found as black as jet. What it is that gives theſe different tinctures to pearls is not known; Taverner aſcribes it to their lying two or three weeks upon ſhore after the oyſter is taken; Reaumur thinks it proceeds from the colour of that part of the fiſh's body upon which the pearl lies. It is moſt probable that this colour proceeds, like the ſpots frequently found on the internal ſurface of the ſhell itſelf, from ſome accident while the pearl is growing.

The beſt coloured pearls and the roundeſt are brought from the Eaſt; thoſe of America are neither ſo white nor ſo exactly oval. All pearls, however, in time become yellow; they may be conſidered as an animal ſubſtance converted into a ſtony hardneſs, and like ivory taking a tincture from the air. They have been even found to decay when in damp or vaulted places, and to moulder into a ſubſtance ſcarce harder than chalk. When the daughters of Stilicon, who were both betrothed, one after the other, to the emperor Honorius, were buried, much of their finery was alſo depoſited with them in the ſame tomb. In this manner they remained buried for above eleven hundred years, till the foundations of the church of St. Peter were laying. Their tomb was then diſcovered, and all their finery was found in tolerable preſervation except their pearls, which were converted by time and damps into a chalky powder.

The wretched people that are deſtined to fiſh for pearls, are either Negroes or ſome of the pooreſt of the natives of Perſia. The inhabitants of this country are divided into tyrants and ſlaves. The divers are not only ſubject to the dangers of the deep, to tempeſts, to ſuffocation at the bottom, to being devoured by ſharks, but from their profeſſion univerſally labour under a ſpitting of blood, occaſioned by the preſſure of air upon their lungs in going down to the bottom. The moſt robuſt and healthy young men are choſen for this employment, but they ſeldom ſurvive it above five or ſix years. Their fibres become rigid; their eye-balls turn red; and they uſually die conſumptive.

It is amazing how very long they are ſeen to continue at the bottom. Some, as we are aſſured, have been known to continue three quarters of an hour under water without breathing; and to one unuſed to diving, ten minutes would ſuffocate the ſtrongeſt. Whether from ſome effort the blood burſts the old paſſage which it had in the fœtus, and circulates without going through the lungs, it is not eaſy to tell; but certain it is that ſome bodies have been diſſected with this canal of communication open, and theſe extraordinary divers may be internally formed in that manner.

Be this as it may, no way of life ſeems ſo laborious, ſo dangerous, or ſo painful. They fiſh for pearls, or rather the oyſters that contain them, in boats twenty eight feet long; and of theſe there are ſometimes three or four hundred at a time, with each ſeven or eight ſtones, which ſerve for anchors. There are from five to eight divers belonging to each, that dive one after another. They are quite naked, except that they have a net hanging down from the neck to put their oyſters in, and gloves on their hands to defend them while they pick the oyſters from the holes in the rocks; for in this manner alone can they be gathered. Every diver is ſunk by means of a ſtone, weighing fifty pounds, tied to the rope by which he deſcends. He places his foot in a kind of ſtirrup, and laying hold of the rope with his left hand, with his right he ſtops his noſe to keep in his breath, as upon going down he takes in a very long inſpiration. They are no ſooner come to the bottom, but they give the ſignal to thoſe who are in the boat to draw up the ſtone; which done, they go to work, filling their net as faſt as they can; and

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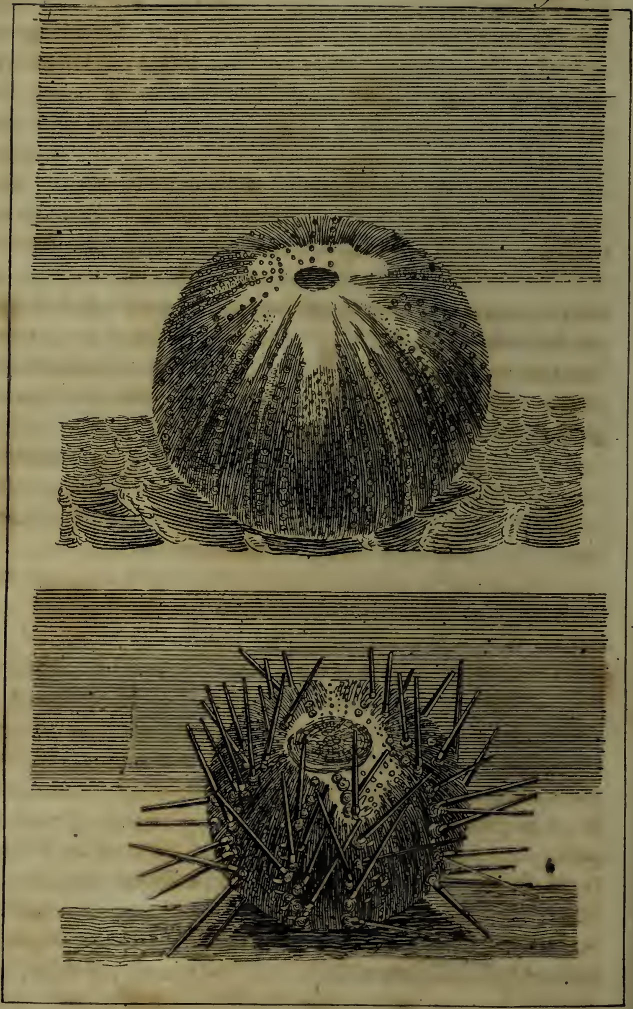


SEA URCHINS

then giving another ſignal, the boats above pull up the net loaded with oyſters, and ſhortly after the diver himſelf to take a new inſpiration. They dive to the depth of fifteen fathoms, and ſeldom go deeper. They generally go every morning by break of day to this fatiguing employment, taking the land wind to waft them out to ſea, and returning with the ſea-breeze at night. The owners of the boats uſually hire the divers, and the reſt of the boats crew, as we do our labourers at ſo much a day. All the oyſters are brought on ſhore, where they are laid in a great heap, till the pearl fiſhery is over, which continues during the months of November and December. When opportunity ſerves, they then examine every oyſter, and it is accidental whether the capture turns out advantageous. Indeed no human being can wiſh well to a commerce, which thus chains ſuch a number of fellow creatures to the bottom, to pluck up a glittering, mouldering pebble.

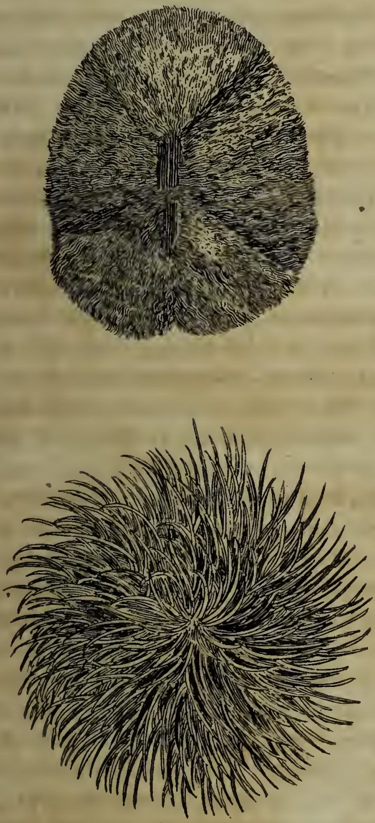
CHAP. VII.

OF MULTIVALVE SHELL-FISH.

MULTIVALVE SHELL-FISH may be conſidered as animals ſhut up in round boxes. To view their habitations externally, one would be little apt to conſider them as the retreats of living creatures; and ſtill leſs, to ſuppoſe that ſome of them carry their boxes with a tolerable ſhare of ſwiftneſs, ſo as to eſcape their purſuers. Of theſe there are principally two kinds; ſuch as move, and ſuch as are ſtationary: the firſt are uſually known in our cabinets by the name of Sea-eggs; the others are as often admired, from the cavities which they ſcoop out for their habitation in the hardeſt marble. The firſt are called, by Naturaliſts, Echini, or Urchins: the latter are called Pholades, or File-fiſh. Of both there are ſeveral ſorts; but, by deſcribing theſe two, we ſhall have a competent idea of all the reſt.

To a ſlight view, the ſea urchin may be compared to the huſk of a cheſnut; being like it round, and with a number of bony prickles ſtanding out on every ſide. To exhibit this extraordinary animal in every light—if we could conceive a turnip ſtuck full of pins on every ſide, and running upon theſe pins with ſome degree of ſwiftneſs, we ſhould have ſome idea of this extraordinary creature. The mouth is placed downwards; the vent is above; the ſhell is a hollow vaſe, reſembling a ſcooped apple; and this filled with a ſoft muſcular ſubſtance, through which the inteſtines wind from the bottom to the top. The mouth, which is placed undermoſt, is large and red, furniſhed with five ſharp teeth, which are eaſily diſcerned. The jaws are ſtrengthened by five ſmall bones, in the centre of which is a ſmall fleſhy tongue; and from this the inteſtines make a winding of five ſpires, round the internal ſides of the ſhell, ending at top, where the excrements are excluded. But what makes the moſt extraordinary part of this animal's conformation, are its horns and its ſpines, that point from every part of the body, like the horns of a ſnail, and that ſerve at once as legs to move upon, as arms to feel with, and as inſtruments of capture and defence. Between theſe horns it has alſo ſpines that are not endued with ſuch a ſhare of motion. The ſpines and the horns iſſue from every part of the body; the ſpines being hard and prickly; the horns being ſoft, longer than the ſpines, and never ſeen except in the water. They are put forward and withdrawn like the horns of a ſnail, and are hid at the baſes of the ſpines, ſerving, as was ſaid before, for procuring food and motion. All this apparatus, however, is only ſeen when the animal is hunting its prey at the bottom of the water; for a few minutes after it is taken, all the horns are withdrawn into the body, and moſt of the ſpines drop off.

It it generally ſaid of inſects, that thoſe which have the greateſt number of legs, always move the ſloweſt: but this animal ſeems to be an exception to the rule; for though furniſhed with two thouſand ſpines, and twelve hundred horns, all ſerving for legs, and from their number ſeeming to impede each other's motion, yet it runs with ſome ſhare of ſwiftneſs at the bottom, and it is ſometimes no eaſy matter to overtake it. It is often taken upon the ebb, by following it in ſhallow water, either in an ozier baſket, or ſimply with the hand. Both the ſpines and the horns aſſiſt its motion;



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and the animal is uſually ſeen running with the mouth downward.

Some kinds of this animal are as good eating as the lobſter; and its eggs, which are of a deep red, are conſidered as a very great delicacy. But of others the taſte is but indifferent; and in all places, except the Mediterranean, they are little ſought for, except as objects of curioſity.

Very different in motion, though not much different in ſhape from theſe, are the Acorn Shell-Fiſh, the Thumb-footed Shell-Fiſh, and the Imaginary Barnacle. Theſe are fixed to one ſpot, and appear to vegetate from a ſtalk. Indeed, to an inattentive ſpectator, each actually ſeems to be a kind of fungus that grows in the deep, deſtitute of animal life as well as motion. But the inquirer will ſoon change his opinion, when he comes to obſerve this muſhroom-like figure more minutely. He will then ſee that the animal reſiding within the ſhell has not only life, but ſome degree of voraciouſneſs; that it has a cover, by which it opens and ſhuts its ſhell at pleaſure; that it has twelve long crooked arms, furniſhed with hair, which it thruſts forth for its prey; and eight ſmaller, which are generally kept in the ſhell. Theſe are ſeen adhering to every ſubſtance that is to be met with in the ocean; rocks, roots of trees, ſhips' bottoms, whales, lobſters, and even crabs, like bunches of grapes, clung to each other. It is amuſing enough to behold their operations*. They for ſome time remain motionleſs within their ſhell; but when the ſea is calm, they are ſeen opening the lid, and peeping about them. They then thruſt out their long neck, look round them for ſome time, and then abruptly retreat back into their box, ſhut their lid, and lurk in darkneſs and ſecurity. Some people eat them; but they are in no great repute at the tables of the luxurious, where their deformed figure would be no objection to their being introduced.

Of all animals of the ſhelly tribe, the Pholades are the moſt wonderful. From their great powers of penetration, compared with their apparent imbecility, they juſtly excite the aſtoniſhment of the curious obſerver. Theſe animals are found in different places; ſometimes clothed in their proper ſhell, at the bottom of the water; ſometimes concealed in lumps of marly earth; and ſometimes lodged, ſhell and all, in the body of the hardeſt marble. In their proper ſhell they aſſume different figures; but, in general, they ſomewhat reſemble a muſcle, except that their ſhell is found actually compoſed of five or more pieces, the ſmaller valves ſerving to cloſe up the opening left by the irregular meeting of two principal ſhells. But their penetration into rocks, and their reſidence there, makes up the moſt wonderful part of their hiſtory.

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* Anderſon's Hiſtory of Greenland.

This animal, when diveſted of its ſhell, reſembles a roundiſh ſoft pudding, with no inſtrument that ſeems in the leaſt fitted for boring into ſtones, or even penetrating the ſofteſt ſubſtances. It is furniſhed with two teeth indeed; but theſe are placed in ſuch a ſituation as to be incapable of touching the hollow ſurface of its ſtony dwelling: it has alſo two covers to its ſhell, that open and ſhut at either end; but theſe are totally unſerviceable to it as a miner. The inſtrument with which it performs all its operations, and buries itſelf in the hardeſt rocks, is only a broad fleſhy ſubſtance, ſomewhat reſembling a tongue, that is ſeen iſſuing from the bottom of its ſhell. With this ſoft, yielding inſtrument, it perforates the moſt ſolid marbles; and having, while yet little and young, made its way, by a very narrow entrance, into the ſubſtance of the ſtone, it then begins to grow bigger, and thus to enlarge its apartment.

The ſeeming unfitneſs, however, of this animal for penetrating into rocks, and there forming an habitation, has induced many philoſophers to ſuppoſe that they entered the rock while it was yet in a ſoft ſtate, and from the petrifying quality of the water, that the whole rock afterwards hardened round them by degrees. Thus any penetrating quality, it was thought, was unjuſtly aſcribed to them, as they only bored into a ſoft ſubſtance, that was hardened by time.—This opinion, however, has been confuted, in a very ſatisfactory manner, by Doctor Bohads, who obſerved, that many of the pillars of the temple of Serapis at Puteoli were penetrated by theſe animals. From thence he very juſtly concludes, that the pholas muſt have pierced into them ſince they were erected; for no workmen would have laboured a pillar into form, if it had been honey-combed by worms in the quarry. In ſhort, there can be no doubt but that the pillars were perfectly ſound when erected; and that the pholades have attacked them, during that time in which they continued buried under water, by means of the earthquake that ſwallowed up the city *.

From hence it appears, that, in all Nature, there is not a greater inſtance of perſeverance and patience than what this animal is ſeen to exhibit. Furniſhed with the blunteſt and ſofteſt augre, by ſlow, ſucceſſive applications, it effects what other animals are incapable of performing by force; penetrating the hardeſt bodies only with its tongue. When, while yet naked and very ſmall, it has effected an entrance, and has buried its body in the ſtone, it there continues for life at its eaſe; the ſea-water that enters at the little aperture ſupplying it with luxurious plenty. When the animal has taken too great a quantity of water, it is ſeen to ſpurt it out of its hole with ſome violence. Upon this ſeemingly thin diet, it quickly grows larger, and ſoon finds itſelf under a neceſſity of enlarging its habitation and its ſhell. The motion of the pholas is ſlow beyond conception; its progreſs keeps pace with the growth of its body; and, in proportion as it becomes larger, it makes its way farther into the rock. When it has got a certain way in, it then turns from its former direction, and hollows downward; till, at laſt, when its habitation is completed, the whole apartment reſembles the bole of a tobacco pipe; the hole in the ſhank being that by which the animal entered.

Thus immured, the pholas lives in darkneſs, indolence, and plenty; it never removes from the narrow manſion into which it has penetrated; and ſeems perfectly content with being incloſed in its own ſepulchre. The influx of the ſea-water, that enters by its little gallery, ſatisfies all its wants; and, without any other food, it is found to grow from ſeven to eight inches long, and thick in proportion.

But they are not ſupplied only with their rocky habitation; they have alſo a ſhell to protect them: this ſhell grows upon them in the body of the rock, and ſeems a very unneceſſary addition to their defence, which they have procured themſelves by art. Theſe ſhells take different forms, and are often compoſed of a different number of valves;

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* Schadſch de Animalibus Marinis, p. 153.

ſometimes ſix; ſometimes but three; ſometimes the ſhell reſembles a tube with holes at either end, one for the mouth, and the other for voiding the excrements.

Yet the pholas thus ſhut up, is not ſo ſolitary an animal as it would at firſt appear; for though it is immured in its hole without egreſs, though it is impoſſible for the animal, grown to a great ſize, to get out by the way it made in, yet many of this kind often meet in the heart of the rock, and, like miners in a ſiege, who ſometimes croſs each other's galleries, they frequently break in upon each other's retreats. Whether their thus meeting be the work of accident or of choice, few can take upon them to determine; certain it is, they are moſt commonly found in numbers in the ſame rock; and ſometimes above twenty are diſcovered within a few inches of each other.

As to the reſt, this animal is found in greateſt numbers at Ancona, in Italy; it is found along the ſhores of Normandy and Poitou, in France; it is found alſo upon ſome of the coaſts of Scotland: and, in general, is conſidered as a very great delicacy, at the tables of the luxurious.

PART V.

OF FROGS, LIZARDS, AND SERPENTS.

BOOK I.

OF FROGS AND TOADS.

CHAP. I.

OF FROGS AND TOADS IN GENERAL.

IF we emerge from the deep, the firſt and moſt obvious claſs of amphibious animals that occur upon land are frogs and toads. Theſe, wherever they reſide, ſeem equally adapted for living upon land and in the water, having their hearts formed in ſuch a manner as to diſpenſe with the aſſiſtance of the lungs in carrying on the circulation. The frog and the toad therefore can live ſeveral days under water, without any danger of ſuffocation; they want but little air at the bottom; and, what is wanting, is ſupplied by lungs, like bladders, which are generally diſtended with wind, and anſwer all the purpoſes of a reſervoir from whence to breathe.

To deſcribe the form of animals ſo well known would be ſuperfluous; to mark thoſe differences that diſtinguiſh them from each may be neceſſary. The frog moves by leaping;

the toad crawls along the ground: the frog is in general leſs than the toad; its colour is brighter, and with a more poliſhed ſurface: the toad is brown, rough, and duſky. The frog is light and active, and its belly comparatively ſmall; the toad is ſlow, ſwolen, and incapable of eſcaping. The frog, when taken, contracts itſelf ſo as to have a lump on its back; the toad's back is ſtraight and even. Their internal parts are nearly the ſame, except that the lungs of the toad are more compact than thoſe of the frog; they have air-bladders, and of conſequence the animal is leſs fitted for living under water. Such are the differences with reſpect to figure and conformation; their habitudes and manners exhibit a greater variety, and require a ſeparate deſcription.

CHAP. II.

OF THE FROG AND ITS VARIETIES.

THE external figure of the Frog is too well known to need a deſcription. Its power of taking large leaps is remarkably great, compared to the bulk of its body. It is the beſt ſwimmer of all four-footed animals; and Nature hath finely adapted its parts for thoſe ends, the arms being light and active, the legs and thighs long, and furniſhed with very ſtrong muſcles.

If we examine this animal internally, we ſhall find that it has a very little brain for its ſize; a very wide ſwallow; a ſtomach ſeemingly ſmall, but capable of great diſtenſion. The heart in the frog, as in all other animals that are truly amphibious, has but one ventricle; ſo that the blood can circulate without the aſſiſtance of the lungs, while it keeps under water. The lungs reſemble a number of ſmall bladders joined together, like the cells of a honeycomb: they are connected to the back by muſcles, and can be diſtended or exhauſted at the animal's pleaſure. The male has two teſticuli lying near the kidneys: and the female has two ovaries, lying near the ſame place: but neither male nor female have any of the external inſtruments of generation; the anus ſerving for that purpoſe in both. Such are the moſt ſtriking peculiarities in the anatomy of a frog; and in theſe it agrees with the toad, the lizard, and the ſerpent. They are all formed internally pretty much in the ſame manner, with ſpongy lungs, a ſimple heart, and are deſtitute of the external inſtruments that ſerve to continue the kind.

Of all thoſe who have given hiſtories of the frog, Mr. Ræſel, of Nuremberg, ſeems the moſt accurate and entertaining. His plates of this animal are well known; his aſſiduity and ſkilfulneſs in obſerving its manners are ſtill more deſerving our eſteem. Inſtead, therefore, of following any other, I will take him for my guide; and though it be out of my power to amuſe the reader with his beautiful deſigns, yet there will be ſome merit in tranſcribing his hiſtory.

The Common Brown Frog begins to couple early in the ſeaſon, and as ſoon as the ice is thawed from the ſtagnating waters. In ſome places the cold protracts their genial appetite till April; but it generally begins about the middle of March. The male is uſually of a greyiſh brown colour; the female is more inclining to yellow, ſpeckled with brown. When they couple, the colours of both are nearly alike on the back; but as they change their ſkins almoſt every eighth day, the old one falling off in the form of mucus, the male grows yellower, and the female more brown. In the males the arms and legs are much ſtronger than in the females; and at the time of coupling, they have, upon their thumbs, a kind of fleſhy excreſcence, which they fix firmly to the breaſt of the female. This Linnæus ſuppoſed to be the male inſtrument of generation; but, by cloſer inſpection, it is found only of ſervice in holding the female in a more ſtrict embrace. It may be cut off, and the impregnation continue unimpaired: it is ſometimes found in the oppoſite ſex; and ſome of the males are found entirely without it: however, when it is cut off, the male cannot hold the female ſo ſtrongly as before.

The ſex couple only once a year; and then continue united ſometimes for four days together. At this time they both have their bellies greatly ſwolen; that of the female being filled with eggs; the male having the ſkin of the whole body diſtended with a limpid water, which is ejected in impregnation. As ſoon as the male has leaped upon the female, he throws his fore legs round her breaſt, and cloſes them ſo firmly that is impoſſible with the naked hands to looſe them. The male claſps his fingers between each other, in the ſame manner as people when they are praying; the thumbs preſs with their thickeſt ſides againſt the breaſt of the female; and though ſhe ſhould ſtruggle ever ſo much, nothing can induce him to let go his hold. The graſp ſeems involuntary and convulſive; they cannot be eaſily torn aſunder; and they ſwim, creep, and live united for ſome days ſucceſſively, till the female has ſhed her ſpawn, which at length ſhe does almoſt in an inſtant. But how the impregnation is performed, without any apparent inſtruments of generation, has long been an object of inquiry; and ſtill continues in great obſcurity. To inveſtigate the difficulty as carefully as poſſible, our German philoſopher continued to examine their mutual congreſs for three years together, and availed himſelf of all the lights that the knife, or analogy, could furniſh.

After having choſen twelve couple of frogs that were thus joined to each other, and having placed each couple in a glaſs veſſel with water, he ſcarce let them out of his ſight day or night, and even ſate up two nights together to examine their operations. The firſt day he obſerved nothing that deſerved remark; but the ſecond they began to be agitated more than before; the males made a noiſe ſomewhat reſembling the grunting of a hog; the females only kept ſinking and riſing in the water.

The male of the firſt couple ejected the humidity with which his body was ſwolen, by which the water in the glaſs was made muddy; and he ſoon after quitted the female.—Our philoſopher continued for twelve hours to obſerve whether the female would caſt her ſpawn; but finding her tardy, he diſſected both her and the male: in the latter, the ſpermatic veſſels were quite empty, as might naturally have been ſuppoſed; but for the female, her ſpawn ſtill remained in her body. Upon its being extracted, and put into water, it periſhed without producing any animal whatever From hence he juſtly concluded, that it required that the eggs ſhould be ejected from the body of the female before they could be at all prolific. In another pair the male quitted the ſemale, who did not eject her ſpawn till ſixteen days after; and theſe, like the former, came to nothing. But it was very different with ſome of the reſt. The females ejected their ſpawn, while the male ſtill remained in his ſtation, and impregnated the maſſes at different intervals as they fell from her; and theſe all brought forth animals in the uſual courſe of generation. From theſe obſervations it was eaſy to infer, that the female was impregnated neither by the mouth, as ſome philoſophers imagined, nor by the excreſcence at the thumbs, as was the opinion of Linnæus, but by the inſperſion of the male ſeminal fluid upon the eggs as they proceeded from the body.

A ſingle female produces from ſix to eleven hundred eggs at a time; and, in general, ſhe throws them all out together, by a ſingle effort; though ſometimes ſhe is an hour in performing this taſk. While ſhe is thus bringing forth, it may be obſerved, that the male acts the part of a midwife, and promotes the expulſion of the eggs by working with his thumbs, and compreſſing the female's body more cloſely. The eggs which were compreſſed in the womb, upon being emitted, expand themſelves into a round form, and drop to the bottom of the water, while the male ſwims off, and ſtrikes with his arms as uſual, though they had continued ſo long in a ſtate of violent contraction.

The egg, or little black globe, which produces a tadpole, is ſurrounded with two different kinds of liquor. That which immediately ſurrounds the globe is clear and tranſparent, and contained in its proper membrane; that which ſurrounds the whole is muddy and mucous. The tranſparent liquor ſerves for the nouriſhment of the tadpole from time to time; and anſwers the ſame purpoſe that the white of the egg does to birds. The tadpoles, when this membrane is broken, are found to adhere with their mouth to part of it; and when they get free, they immediately ſink to the bottom of the water, never being able to get to the top after, while they continue in their tadpole form.

But to return—When the ſpawn is emitted and impregnated by the male, it drops, as was ſaid to the bottom, and there the white quickly and inſenſibly increaſes. The eggs, which during the four firſt hours ſuffer no perceptible change, begin then to enlarge and grow lighter; by which means they mount to the ſurface of the water. At the end of eight hours, the white in which they ſwim grows thicker, the eggs loſe their blackneſs, and, as they increaſe in ſize, ſomewhat of their ſpherical form. The twenty-firſt day, the egg is ſeen to open a little on one ſide, and the beginning of a tail to peep out, which becomes more and more diſtinct every day. The thirty-ninth day the little animal begins to have motion; it moves at intervals its tail; and it is perceived that the liquor in which it is circumfuſed, ſerves it for nouriſhment. In two days more, ſome of theſe little creatures fall to the bottom; while others remain ſwimming in the fluid around them, while their vivacity and motion is ſeen to increaſe. Thoſe which fall to the bottom remain there the whole day; but having lengthened themſelves a little, for hitherto they are doubled up, they mount at intervals to the mucus which they had quitted, and are ſeen to feed upon it with great vivacity. The next day they acquire their tadpole form. In three days more they are perceived to have two little fringes, that ſerve as fins, beneath the head; and theſe, in four days after, aſſume a more perfect form. It is then, alſo, that that they are ſeen to feed very greedily upon the pond-weed with which they are to be ſupplied; and, leaving their former food, on this they continue to ſubſiſt till they arrive at maturity. When they come to be ninety-two days old, two ſmall feet are ſeen beginning to burgeon near the tail; and the head appears to be ſeparate from the body. The next day, the legs are conſiderably enlarged; four days after they refuſe all vegetable food; their mouth appears furniſhed with teeth; and their hinder-legs are completely formed. In two days more the arms are completely produced; and now the frog is every way perfect, except that it ſtill continues to carry the tail. In this odd ſituation the animal, reſembling at once both a frog and a lizard, is ſeen frequently riſing to the ſurface, not to take food but to breathe. In this ſtate it continues for about ſix or eight hours, and then, the tail dropping off by degrees, the animal appears in its moſt perfect form.

Thus the frog, in leſs than a day, having changed its figure, is ſeen to change its appetites alſo. So extraordinary is this transformation, that the food it fed upon ſo greedily but a few days before, is now utterly rejected; it would even ſtarve if ſupplied with no other. As ſoon as the animal acquires its perfect ſtate, from having fed upon vegetables, it becomes carnivorous, and lives entirely upon worms and inſects. But as the water cannot ſupply theſe, it is obliged to quit its native element, and ſeek for food upon land, where it lives by hunting worms, and taking inſects by ſurpriſe. At firſt, being feeble and unable to bear the warmth of the ſun, it hides among buſhes and under ſtones; but when a ſhower comes to refreſh the earth, then the whole multitude are ſeen to quit their retreats, in order to enjoy the grateful humidity. Upon many occaſions the ground is ſeen perfectly blackened with their numbers; ſome hunting for prey, and ſome ſeeking ſecure lurking places. From the myriads that offer on ſuch occaſions, ſome have been induced to think that theſe animals were generated in the clouds, and thus ſhowered down on the earth. But had they, like Derham, traced them to the next pool, they would have found out a better ſolution for the difficulty.

The frog lives for the moſt part out of the water; but when the cold nights begin to ſet in, it returns to its native element, always chooſing ſtagnant waters, where it can lie without danger concealed at the bottom. In this manner it continues torpid, or with but very little motion, all the winter: like the reſt of the dormant race, it requires no food; and the circulation is ſlowly carried on without any aſſiſtance from the air.

It is at the approach of ſpring that all theſe animals are rouzed from a ſtate of ſlumber to a ſtate of enjoyment. A ſhort time after they riſe from the bottom they begin to pair, while thoſe that are as yet too young come upon land before the reſt. For this reaſon, while the old ones continue concealed in the beginning of ſpring, the ſmall ones are more frequently ſeen; the former remaining in the lake to propagate, while the latter are not yet arrived at a ſtate of maturity.

The difference of ſexes, which was mentioned above, is not perceivable in theſe animals, until they have arrived at their fourth year; nor do they begin to propagate, till they have completed that period. By comparing their ſlow growth with their other habitudes, it would appear that they live about twelve years; but having ſo many enemies, both by land and water, it is probable that few of them arrive at the end of their term.

Frogs live upon inſects of all kinds; but they never eat any unleſs they have motion. They continue fixed and immoveable till their prey appears; and juſt when it comes ſufficiently near, they jump forward with great agility, dart out their tongues, and ſeize it with certainty. The tongue, in this animal, as in the toad, lizard, and ſerpent kinds, is extremely long, and formed in ſuch a manner, that it ſwallows the point down its throat; ſo that a length of tongue is thus drawn out, like a ſword from its ſcabbard, to aſſail its prey. This tongue is furniſhed with a glutinous ſubſtance; and whatever inſect it touches, infallibly adheres, and is thus held faſt till it is drawn into the mouth.

As the frog is thus ſupplied with the power of catching its prey, it is alſo very vivacious, and able to bear hunger for a very long time. I have known one of them continue a month in ſummer without any other food than the turf on which it was placed in a glaſs veſſel. We are told of a German ſurgeon, that kept one eight years in a glaſs veſſel, covered with a net. Its food was at all times but ſparing; in ſummer he gave it freſh graſs, which it is ſaid to have fed upon; and, in the winter, hay, a little moiſtened: he likewiſe now and then put flies into the glaſs, which it would follow with an open mouth, and was very expert in catching them. In winter, when the flies were difficult to be found, it uſually fell away, and grew very lean; but in the ſummer, when they were plenty, it ſoon grew fat again. It was kept in a warm room, and was always lively and ready to take its prey; however, in the eighth winter, when there were no flies to be found, it fell away and died. It is not certain how long it might have lived, had it been ſupplied with proper nouriſhment; but we are certain, that a very little food, is capable of ſufficing its neceſſities.

Nor is the frog leſs tenacious of life. It will live and jump about ſeveral hours after its head has been cut off. It will continue active, though all its bowels are taken out; and it can live ſome days, though entirely ſtripped of its ſkin. This cruel trick, which is chiefly practiſed among ſchoolboys, of ſkinning frogs, an operation which is done in an inſtant, ſeems for ſome hours no way to abate their vigour. I am aſſured that ſome of them get a new ſkin, and recover after this painful experiment.

The croaking of frogs is well known; and, from thence, in ſome countries, they are diſtinguiſhed by the ludicrous title of Dutch Nightingales. Indeed, the aquatic frogs of Holland are loud beyond what one would imagine. We could hardly conceive that an animal not bigger than one's fiſt, ſhould be able to ſend forth a note that is heard at three miles diſtance; yet ſuch is actually the caſe*. The large water-frogs have a note as loud as the bellowing of a bull; and, for this purpoſe, puff up the cheeks to a ſurpriſing magnitude. Of all frogs, however, the male only croaks; the female is ſilent, and the voice in the other ſeems to be the call to courtſhip It is certain, that at theſe times when they couple, the loudneſs of their croaking is in ſome places very troubleſome; for then the whole lake ſeems vocal; and a thouſand diſſonant notes perfectly ſtun the neighbourhood. At other times, alſo, before wet weather, their voices are in full exertion; they are then heard with unceaſing aſſiduity, ſending forth their call, and welcoming the approaches of their favourite moiſture. No weather-glaſs was ever ſo true as a frog in foretelling an approaching change; and, in fact, the German ſurgeon, mentioned above, kept his frog for that purpoſe. It was always heard to croak at the approach of wet weather; but was as mute as a fiſh, when it threatened a continuance of fair. This may probably ſerve to explain an opinion which ſome entertain, that there is a month in the year called *Paddock Moon*, in which the frogs never croak: the whole ſeems to be no more than that, in the hot ſeaſon, when the moiſture is dried away, and conſequently when theſe animals neither enjoy the quantity of health or food that at other times they are ſupplied with, they ſhew, by their ſilence, how much they are diſpleaſed with the weather. All very dry weather is hurtful to their health, and prevents them from getting their prey. They ſubſiſt chiefly upon worms and ſnails; and as drought prevents theſe from appearing, the frog is thus ſtinted in its proviſions, and alſo wants that grateful humidity which moiſtens its ſkin, and renders it alert and active.

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* Ræſel, ibid.

As frogs adhere cloſely to the backs of their own ſpecies, ſo it has been found, by repeated experience, they will alſo adhere to the backs of fiſhes. Few that have ponds, but know that theſe animals will ſtick to the backs of carp, and fix their fingers in the corner of each eye. In this manner they are often caught together; the carp blinded and waſted away. Whether this proceeds from the deſires of the frog, diſappointed of its proper mate, or whether it be a natural enmity between frogs and fiſhes, I will not take upon me to ſay. A ſtory told us by Walton, might be apt to incline us to the latter opinion.

"As Dubravius, a biſhop of Bohemia, was walking with a friend by a large pond in that country, they ſaw a frog, when a pike lay very ſleepily and quiet by the ſhore ſide, leap upon his head, and the frog having expreſſed malice or anger by his ſwolen cheeks and ſtaring eyes, did ſtretch out his legs, and embraced the pike's head, and preſently reached them to his eyes, tearing with them and his teeth thoſe tender parts; the pike irritated with anguiſh, moves up and down the water, and rubs himſelf againſt weeds, and whatever he thought might quit him of his enemy; but all in vain, for the frog did continue to ride triumphantly, and to bite and torment the pike till his ſtrength failed, and then the frog ſunk with the pike to the bottom of the water: then preſently the frog appeared again at the top and croaked, and ſeemed to rejoice like a conqueror; after which he preſently retired to his ſecret hole. The biſhop that had beheld the battle, called his fiſherman to fetch his nets, and by all means to get the pike, that they might declare what had happened. The pike was drawn forth, and both his eyes eaten out; at which when they began to wonder, the fiſherman wiſhed them to forbear, and aſſured them he was certain that pikes were often ſo ſerved."

CHAP. III.

OF THE TOAD AND ITS VARIETIES.

IF we regard the figure of the toad, there ſeems nothing in it that ſhould diſguſt more than that of the frog. Its form and proportions are nearly the ſame; and it chiefly differs in colour which is blacker; and its ſlow and heavy motion, which exhibits nothing of the agility of the frog: yet ſuch is the force of habit, begun in early prejudice, that thoſe who conſider the one as a harmleſs, playful animal, turn from the other with horror and diſguſt. The frog is conſidered as an uſeful aſſiſtant, in ridding our grounds of vermin; the toad, as a ſecret enemy, that only wants an opportunity to infect us with its venom.

The imagination, in this manner biaſſed by its terrors, paints out the toad in the moſt hideous colouring, and clothes it in more than natural deformity. Its body is broad; its back flat; covered with a duſky, pimpled hide; the belly is large and ſwagging; the pace laboured and crawling; its retreat gloomy and filthy; and its whole appearance calculated to excite diſguſt and horror: yet, upon my firſt ſeeing a toad, none of all theſe deformities in the leaſt affected me with ſenſations of loathing: born, as I was, in a country where there are no toads, I had prepared my imagination for ſome dreadful object; but there ſeemed nothing to me more alarming in the ſight, than in that of a common frog; and, indeed, for ſome time, I miſtook and handled the one for the other. When firſt informed of my miſtake, I very well remember my ſenſations: I wondered how I had eſcaped with ſafety, after handling and diſſecting a toad, which I had miſtaken for a frog. I then began to lay in a fund of horror againſt the whole tribe, which, though convinced they are harmleſs, I ſhall never get rid of. My firſt imaginations were too ſtrong not only for my reaſon, but for the conviction of my ſenſes.

As the toad bears a general reſemblance of figure to the frog, ſo alſo it reſeſembles that animal in its nature and appetites. Like the frog, the toad is amphibious; like that animal, it lives upon worms and inſects, which it ſeizes by darting out its length of tongue; and in the ſame manner alſo it crawls about in moiſt weather. The male and female couple as in all the frog kind; their time of propagation being very early in the ſpring. Sometimes the females are ſeen upon land, oppreſſed by the males; but more frequently they are coupled in the water. They continue together ſome hours, and adhere ſo faſt as to tear the very ſkin from the parts they ſtick to. In all this they entirely reſemble the frog; but the aſſiſtance which the male lends the female, in bringing forth, is a peculiarity in this ſpecies that muſt not be paſſed over in ſilence. "In the evening of a ſummer's day, a French gentleman, being in the king's gardens at Paris, perceived two toads coupled together, and he ſtopped to examine them. Two facts equally new ſurpriſed him: the firſt was the extreme difficulty the female had in laying her eggs; the ſecond was the aſſiſtance lent her by the male for this purpoſe. The eggs of the female lie in her body, like beads on a ſtring; and after the firſt, by great effort, was excluded, the male caught it with his hinder paws, and kept working it till he had thus extracted the whole chain. In this manner the animal performed, in ſome meaſure, the functions of a midwife; impregnating, at the ſame time, every egg as it iſſued from the body."

It is probable, however, that this difficulty in bringing forth, obtains only upon land; and that the toad, which produces its ſpawn in the water, performs it with as much eaſe as a frog. They propagate in England, exactly in the manner of frogs; and the female, inſtead of retiring to dry holes, goes to the bottom of ponds, and there lies torpid all the winter, preparing to propagate in the beginning of ſpring. On theſe occaſions, the number of males is found greatly to ſurpaſs that of the other ſex, there being above thirty to one; and twelve or fourteen are often ſeen clinging to the ſame female.

When, like the frog, they have undergone all the variations of their tadpole ſtate, they forſake the water; and are often ſeen, in a moiſt ſummer's evening, crawling up, by myriads, from fenny places, into dryer ſituations. There, having found out a retreat, or having dug themſelves one with their mouth and hands, they lead a patient, ſolitary life, ſeldom venturing out, except when the moiſture of a ſummer's evening invites them abroad. At that time the graſs is filled with ſnails, and the pathways covered with worms, which make their principal food. Inſects alſo of every kind they are fond of; and we have the authority of Linnæus for it, that they ſometimes continue immoveable, with their mouth open, at the bottom of ſhrubs, where the butterflies, in ſome meaſure faſcinated, are ſeen to fly down their throats*.

In a letter from Mr. Arſcott, there are ſome curious particulars relating to this animal, which throws great light upon its hiſtory. "Concerning the toad," ſays he, "that lived ſo many years with us, and was ſo great a favourite, the greateſt curioſity was its becoming ſo remarkably tame: it had frequented ſome ſteps before our hall-door ſome years before my acquaintance commenced with it, and had been admired by my father for its ſize, (being the largeſt I ever met with) who conſtantly paid it a viſit every evening. I knew it myſelf above thirty years; and by conſtantly feeding it, brought it to be ſo tame, that it always came to the candle and looked up, as if expecting to be taken up and brought upon the table, where I always fed it with inſects of all ſorts. It was fondeſt of fleſh maggots, which I kept in bran; it would follow them, and when within a proper diſtance, would fix his eyes and remain motionleſs for near a quarter of a minute, as if preparing for the ſtroke, which was an inſtantaneous throwing its tongue at a great diſtance upon the inſect, which ſtuck to the tip by a glutinous matter. The motion is quicker than the eye can follow. I cannot ſay how long my father had been acquainted with the toad, before I knew it; but when I was firſt acquainted with it, he uſed to mention it as the old toad I have known ſo many years.: I can anſwer for thirty-ſix years. This old toad made its appearance as ſoon as the warm weather came; and I always concluded it retired to ſome dry bank, to repoſe till ſpring. When we new-layed the ſteps, I had two holes made in the third ſtep, on each with a hollow of more than a yard long for it; in which I imagine it ſlept, as it came from thence at its firſt appearance. It was ſeldom provoked. Neither that toad, nor the multitudes I have ſeen tormented with great cruelty, ever ſhewed the leaſt deſire of revenge, by ſpitting or emiting any juice from their pimples. Sometimes, upon taking it up, it would let out a great quantity of clear water, which, as I have often ſeen it do the ſame upon the ſteps when quite quiet, was certainly its urine, and no more than a natural evacuation. Spiders, millipedes, and fleſh maggots, ſeem to be this animal's favourite food. I imagine if a bee was to be put before a toad, it would certainly eat it to its coſt*; but as bees are ſeldom ſtirring at the ſame time that toads are, they rarely come in their way; as they do not appear after ſun-riſing, or before ſun-ſet. In the heat of the day they will come to the mouth of their hole, I believe for air. I once, from my parlour window, obſerved a large toad I had in the bank of a bowling-green, about twelve at noon in a very hot day, very buſy and active upon the graſs. So uncommon an appearance made me go out to ſee what it was; when I found an innumerable ſwarm of winged ants had dropped round his hole; which temptation was as irreſiſtible as a turtle would be to a luxurious alderman. In reſpect to its end, had it not been for a tame raven, I make no doubt but it would have been now living. This bird, one day ſeeing it at the mouth of its hole, pulled it out, and although I reſcued it, pulled out one eye, and hurt it ſo, that notwithſtanding its living a twelvemonth, it never enjoyed itſelf, and had a difficulty of taking its food, miſſing the mark for want of its eye. Before that accident, it had all the appearance of perfect health."

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* Amænit. vol. vi. p. 201.

To this account of the toad's inoffenſive qualities, I will add another from Valiſnieri, to ſhew that, even taken internally, the toad is no way dangerous. "In the year 1692, ſome German ſoldiers, who had taken poſſeſſion of the caſtle of Arceti, finding that the peaſants of the country often amuſed themſelves in catching frogs, and dreſſing them for the table; reſolved to provide themſelves with a like entertainment, and made preparations for frog fiſhing, in the ſame manner. It may eaſily be ſuppoſed that the Italians and their German gueſts were not very fond of each other; and indeed it is natural to think that the ſoldiers gave the poor people of the country many good reaſons for diſcontent. They were not a little pleaſed, therefore, when they ſaw them go to a ditch where toads inſtead of frogs were found in abundance. The Germans, no way diſtinguiſhing, in their ſport, caught them in great numbers; while the peaſants kept looking on, ſilently flattering themſelves with the hopes of ſpeedy revenge. After being brought home, the toads were dreſſed up after the Italian faſhion; the peaſants quite happy at ſeeing their tyrants devour them with ſo good an appetite, and expecting every moment to ſee them drop down dead: But what was their ſurpriſe to find, that the Germans continued as well as ever, and only complained of a ſlight excoriation of the lips, which probably aroſe from ſome other cauſe than that of the repaſt."

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* Ræſel tried a frog; it ſwallowed the bee alive: its ſtomach was ſtung, and the animal vomitted it up again.

I will add another ſtory from Solenander; who tells us, that a tradeſman of Rome and his wife had long lived together with mutual diſcontent; the man was dropſical, and the woman amorous: this ill-matched ſociety promiſed ſoon, by the very infirm ſtate of the man, to have an end; but the woman was unwilling to wait the progreſs of the diſorder; and therefore concluded that, to get rid of her huſband, nothing was left her put poiſon. For this purpoſe, ſhe choſe out a doſe that ſhe ſuppoſed would be the moſt effectual; and having calcined ſome toads, mixed their powder with his drink. The man, after taking a hearty doſe, found no conſiderable inconvenience, except that it greatly promoted urine. His wife, who conſidered this as a beginning ſymptom of the venom, reſolved not to ſtint the next doſe, but gave it in greater quantities than before. This alſo increaſed the former ſymptom; and, in a few days, the woman had the mortification to ſee her deteſted huſband reſtored to perfect health; and remained in utter deſpair of her being a widow.

From all this it will appear with what injuſtice this animal has hitherto been treated. It has undergone every reproach; and mankind have been taught to conſider as an enemy, a creature that deſtroys that inſect tribe which are their real invaders. We are to treat, therefore, as fables, thoſe accounts that repreſent the toad as poſſeſſed of poiſon to kill at a diſtance; of its ejecting its venom, which burns wherever it touches; of its infecting thoſe vegetables near which it reſides; of its exceſſive fondneſs for ſage, which it renders poiſonous by its approach: theſe, and an hundred others of the ſame kind, probably took riſe from an antipathy which ſome have to all animals of the kind. It is an harmleſs, defenceleſs creature, torpid and unvenomous, and ſeeking the darkeſt retreats, not from the malignity of its nature, but the multitude of its enemies.

Like all of the frog kind, the toad is torpid in winter. It chuſes then for a retreat either the hollow root of a tree, the cleft of a rock, or ſometimes the bottom of a pond, where it is found in a ſtate of ſeeming inſenſibility. As it is very long-lived, it is very difficult to be killed; its ſkin is tough and cannot be eaſily pierced; and, though covered with wounds, the animal continues to ſhew ſigns of life, and every part appears in motion. But what ſhall we ſay to its living for centuries lodged in the boſom of a rock, or caſed within the body of an oak tree, without the ſmalleſt acceſs on any ſide either for nouriſhment or air, and yet taken out alive and perfect! Stories of this kind it would be as raſh to contradict, as difficult to believe; we have the higheſt authorities bearing witneſs to their truth, and yet the whole analogy of Nature ſeems to arraign them of falſehood. Bacon aſſerts, that toads are found in this manner; Doctor Plot aſſerts the ſame: There is to this day a marble chimney-piece at Chatſworth with the print of the toad upon it, and a tradition of the manner in which it was found. In the Memoirs of the Academy of Sciences there is an account of a toad found alive and healthy in the heart of a very thick elm, without the ſmalleſt entrance or egreſs*. In the year 1731, there was another found near Nants in the heart of an old oak, without the ſmalleſt iſſue to its cell; and the diſcoverer was of opinion, from the ſize of the tree, that the animal could not be confined there leſs than eighty or an hundred years, without ſuſtenance and without air. To all theſe we can only oppoſe the ſtrangeneſs of the facts; the neceſſity this animal appears under of receiving air; and its dying like all other animals in the air-pump, when deprived of this all-ſuſtaining fluid. But whether theſe be objections to weigh againſt ſuch reſpectable and diſintereſted authority, I will not pretend to determine; certain it is that, if kept in a damp place, the toad will live for ſeveral months without any food whatſoever.

To this extraordinary account, which is doubtful, I will add another not leſs ſo; which is that of toads ſucking cancerous breaſts, and thus extracting the venom and performing a cure. The firſt account we have of this is in a letter to the Biſhop of Carliſle from Doctor Pitfield, who was the firſt perſon of conſequence that attended the experiment. His letter is as follows:

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* Vide the Year 1719.

"Your Lordſhip muſt have taken notice of a paragraph in the papers with regard to the application of toads to a cancered breaſt. A patient of mine has ſent to the neighbourhood of Hungerford, and brought down the very woman on whom the cure was done. I have, with all the attention I am capable of, attended the operation for eighteen or twenty days, and am ſurpriſed at the phenomenon. I am in no expectation of any great ſervice from the application; the age, conſtitution, and thoroughly cancerous condition of the perſon, being unconquerable barriers to it. How an ailment of that kind, abſolutely local, in an otherwiſe ſound habit and of a likely age, might be relieved I cannot ſay. But as to the operation, thus much I can aſſert, that there is neither pain nor nauſeouſneſs in it. The animal is put into a linen bag all but its head, and that is held to the part. It has generally inſtantly laid hold of the fouleſt part of the ſore, and ſucked with greedineſs until it dropped off dead. It has frequently happened that the creature has ſwolen immediately, and from its agonies appeared to be in great pain. I have weighed them for ſeveral days together, before and after the application, and found their increaſe of weight, in their different degrees, from a drachm to near an ounce. They frequently ſweat exceedingly, and turn quite pale; ſometimes they diſgorge, recover, and become lively again: I think the whole ſcene is ſurpriſing, and a very remarkable piece of natural hiſtory. From the conſtant inoffenſiveneſs which I have obſerved in them, I almoſt queſtion the truth of their poiſonous ſpitting. Many people here expect no great good from the application of toads to cancers; and where the diſorder is not abſolutely local none is to be expected. When it is ſeated in any part not to be well come at for extirpation, I think it is hardly to be imagined, but that the having it ſucked clean as often as you pleaſe, muſt give great relief. Every body knows that dogs licking of ſores cures them, which is I ſuppoſe chiefly by keeping them clean. If there is any credit to be given to hiſtory, poiſons have been ſucked out. *Pallentia vulnera lambit ore venena trahens*, are the words of Lucan on the occaſion. If the people to whom theſe words are applied did their cure by immediately following the injection of the poiſon, the local confinement of another poiſon brings the caſe to a great degree of ſimiliarity. I hope I have not tired your Lordſhip with my long tale: as it is a true one, and in my apprehenſion a curious piece of natural hiſtory, I could not forbear communicating it to you. I own I thought the ſtory in the papers to be an invention; and when I conſidered the inſtinctive principle in all animals of ſelf-preſervation, I was confirmed in my diſbelief: but what I have related I ſaw; and all theory muſt yield to fact. It is only the Rubeth, the land toad, which has the property of ſucking: I cannot find any the leaſt mention of the property in any one of the old naturaliſts. My patient can bear to have but one applied in twenty-four hours. The woman who was cured had them on day and night without intermiſſion for five weeks. Their time of hanging at the breaſt has been from one to ſix hours."

Other remarks made upon their method of performing this extraordinary operation are as follow. "Some toads die very ſoon after they have ſucked; others live about a quarter of an hour, and ſome much longer. For example, one that was applied about ſeven o'clock ſucked till ten, and died as ſoon as it was taken from the breaſt, another that immediately ſucceeded continued till three o'clock, but dropped dead from the wound: each ſwelled exceedingly, and of a pale colour. They do not ſeem to ſuck greedily, and often turn their heads away; but during the time of their ſucking, they were heard to ſmack their lips like a young child*."

From this circumſtantial account of the progreſs of this extraordinary application, one could hardly ſuppoſe that any doubt could remain of the ingenious obſerver's accuracy; and yet, from information which I have received from authority ſtill more reſpectable, there is much reaſon as yet to ſuſpend our aſſent. A lady, who was under the care of the preſent preſident of the college of phyſicians, was induced by her friends, to try the experiment; and as he ſaw the caſe was deſperate, and that it would quiet her mind as well

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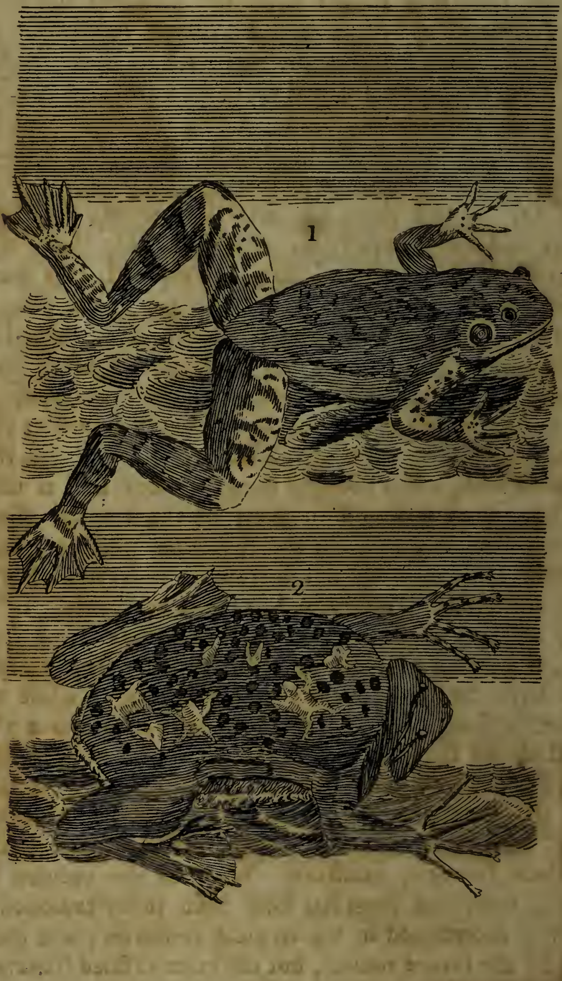
* Britiſh Zoology, vol. iii. p. 338.



1 The Bull Frog P 89
2 The Pipal P 96

as theirs, he permitted the trial. During the whole continuance of their application, ſhe could never thoroughly perceive that they ſucked her; but that did not prevent their ſwelling and dying, as in the former inſtances. Once indeed, ſhe ſaid, ſhe thought that one of them ſeemed to ſuck; but the phyſician, and thoſe who attended, could not perceive any appearance of it. Thus, after all, it is a doubt whether theſe animals die by the internal or the external application of the cancerous poiſon.

Of this animal there are ſeveral varieties; ſuch as the Water and the Land-Toad, which probably differ only in the ground-colour of their ſkin. In the firſt, it is more inclining to aſh-colour, with brown ſpots; in the other, the colour is brown, approaching to black. The water-toad is not ſo large as the other; but both equally breed in that element. The ſize of the toad with us is generally from two to four inches long; but in the fenny countries of Europe, I have ſeen them much larger, and not leſs than a common crab, when brought to table. But this is nothing to what they are found in ſome of the tropical climates, where travellers often, for the firſt time, miſtake a toad for a tortoiſe. Their uſual ſize is from ſix to ſeven inches; but there are ſome ſtill larger, and as broad as a plate. Of theſe ſome are beautifully ſtreaked and coloured; ſome ſtudded over, as with pearls; others briſtled with horns or ſpines; ſome have the head diſtinct from the body, while others have it ſo ſunk in, that the animal appears without a head. All theſe are found in the tropical climates, in great abundance; and particularly after a ſhower of rain. It is then that the ſtreets ſeems entirely paved with them; they then crawl from their retreats, and go into all places to enjoy their favourite moiſture. With us the opinion of its raining toads and frogs has long been juſtly exploded; but it ſtill is entertained in the tropical countries; and that not only by the ſavage natives, but the more refined ſettlers, who are apt enough to add the prejudices of other nations to their own.

It would be a tedious, as well as an uſeleſs taſk, to enter into all the minute diſcriminations of theſe animals, as found in different countries or places; but the Pipal, or the Surinam Toad, is too ſtrange a creature not to require an exact deſcription. There is not, perhaps, in all Nature a more extraordinary phœnomenon, than that of an animal breeding and hatching its young in its back; from whence, as from a kind of hot-bed, they crawl one after the other, when come to maturity.

The pipal, is in form more hideous than even the common toad; Nature ſeeming to have marked all thoſe ſtrange-mannered animals with peculiar deformity. The body is flat and broad; the head ſmall; the jaws, like thoſe of a mole, are extended, and evidently formed for rooting in the ground: the ſkin of the neck forms a ſort of wrinkled collar: the colour of the head is of a dark cheſnut, and the eyes are ſmall: the back, which is very broad, is of a lightiſh grey, and ſeems covered over with a number of ſmall eyes, which are round, and placed at nearly equal diſtances. Theſe eyes are very different from what they ſeem; they are the animal's eggs, covered with their ſhells, and placed there for hatching. Theſe eggs are buried deep in the ſkin, and in the beginning of incubation but juſt appear; and are very viſible when the young animal is about to burſt from its confinement. They are of a reddiſh, ſhining yellow colour; and the ſpaces between them are full of ſmall warts, reſembling pearls.

This is their ſituation, previous to their coming forth; but nothing ſo much demands our admiration, as the manner of their production. The eggs, when formed in the ovary, are ſent by ſome internal canals, which anatomiſts have not hitherto deſcribed, to lie and come to maturity under the bony ſubſtance of the back: in this ſtate they are impregnated by the male, whoſe ſeed finds it way by pores very ſingularly contrived, and pierces not only the ſkin but the perioſteum. The ſkin, however, is ſtill apparently entire, and forms a very thick covering over the whole brood; but as they advance to maturity, at different intervals, one after another, the egg ſeems to ſtart forward and burgeon from the back, becomes more yellow, and at laſt breaks; when the young one puts forth its head: it ſtill, however, keeps its ſituation, until it has acquired a proper degree of ſtrength, and then it leaves the ſhell, but ſtill continues to keep upon the back of the parent. In this manner the pipal is ſeen travelling with her wonderous family on her back, in all the different ſtages of maturity. Some of the ſtrange progeny, not yet come to ſufficient perfection, appear quite torpid, and as yet without life in the egg: others ſeem juſt beginning to riſe through the ſkin; here peeping forth from the ſhell; and there, having entirely forſaken their priſon: ſome are ſporting at large upon the parent's back; and others deſcending to the ground, to try their own fortune below.

Such is the deſcription given us of this ſtrange production by Seba, in which he differs from Ruyſch, who affirms, that the young ones are bred in the back of the male only, where the female lays her eggs. I have followed Seba, however, not becauſe he is better authority, but becauſe he is more poſitive of the truth of his account, and aſſerts, aſſuredly, that the eggs are found on the back of the female only. Many circumſtances, however, are wanting towards completing his information; ſuch as a deſcription of the paſſage by which the egg finds its way into the back; the manner of its fecundation; the time of geſtation; as alſo a hiſtory of the manners of this ſtrange animal itſelf: but, by a prolixity that too much prevails among naturaliſts at preſent, he leaves the moſt intereſting object of curioſity, to give us a detailed deſcription of the legs and claws of the pipal, about which we have very little concern.

The male pipal is every way larger than the female, and has the ſkin leſs tightly drawn round the body. The whole body is covered with puſtules reſembling pearls; and the belly, which is of a bright yellow, ſeems as if it were ſewed up from the throat to the vent, a ſeam being ſeen to run in that direction. This animal, like the reſt of the frog kind, is moſt probably harmleſs; though we are told of terrible effects reſulting from its powder when calcined. This, however, muſt certainly be falſe; no creature whatever, when calcined, can be poiſonous; for the fire burns away whatever might have been dangerous in their compoſition: all animal ſubſtances, when calcined, being entirely the ſame.

BOOK II.

OF THE LIZARD KIND.

CHAP. I.

OF LIZARDS IN GENERAL.

THERE is ſcarce a naturaliſt, who has treated of lizards, but has a particular manner of ranking them in the ſcale of Animated Nature. Ray, rather ſtruck with the number of their legs, than their habits and conformation, has exalted them among quadrupeds; while Linnæus, attentive only to their long, ſlender forms, has degraded them among ſerpents. Briſſon gives them a diſtinct claſs by themſelves, under the name of *reptiles*. Klein gives them a claſs inferior to beaſts, under the name of *naked quadrupeds*. Some, in ſhort, from their ſcaly covering, and fondneſs for the water, have given them to the fiſhes; while there have not been wanting naturaliſts who have claſſed them with inſects as the ſmaller kinds of this claſs ſeem to demand.

It is indeed no eaſy matter to tell to what claſs in Nature lizards are chiefly allied. They are unjuſtly raiſed to the rank of beaſts, as they bring forth eggs, diſpenſe with breathing, and are not covered with hair. They cannot be placed among fiſhes, as the majority of them live upon land: they are excluded from the ſerpent tribe, by their feet, upon which they run with ſome celerity; and from the inſects, by their ſize; for though the Newt may be looked upon in this contemptible light, a Crocodile would be a terrible inſect indeed. Thus lizards are, in ſome meaſure, excluded from every rank; while they exhibit ſomewhat of the properties of all; the legs and celerity of the quadruped; a facility of creeping through narrow and intricate ways, like the ſerpent; and a power of living in the water, like fiſhes; however, though endued with theſe various powers, they have no real advantages over any other claſs of Animated Nature; for what they gain in aptitude for one element, they loſe in their fitneſs for another. Thus, between both, they are an awkward, ungainly tribe; neither ſo alert upon land, nor ſo nimble in the water, as the reſpective inhabitants of either abode: and, indeed, this holds throughout all Nature, that in proportion as the ſeeming advantages of inferior animals are multiplied, their real ones are abridged; and all their inſtincts are weakened and loſt, by the variety of channels into which they are divided.

As lizards thus differ from every other claſs of animals, they alſo differ widely from each other. With reſpect to ſize, no claſs of beings has its ranks ſo oppoſite. What, for inſtance, can be more removed than the ſmall Cameleon, an inch long, and the Alligator of the river Amazons, above twenty-ſeven feet? To an inattentive obſerver, they would appear entirely of different kinds; and Seba wonders how they ever came to be claſſed together.

The colour of theſe animals alſo is very various, as they are found of a hundred different hues, green, blue, red, cheſnut, yellow, ſpotted, ſtreaked, and marbled. Were colour alone capable of conſtituting beauty, the lizard would often pleaſe; but there is ſomething ſo repreſſing in the animal's figure, that the brilliancy of its ſcales, or the variety of its ſpots, only tend to give an air of more exquiſite venom of greater malignity. The figure of theſe animals is not leſs various: ſometimes ſwolen in the belly; ſometimes purſed up at the throat; ſometimes with a rough ſet of ſpines on the back, like the teeth of a ſaw; ſometimes with teeth; at others with none; ſometimes venomous, at others harmleſs, and even philanthropic: ſometimes ſmooth and even; ſometimes with a long, ſlender tail; and often with a ſhorter blunt one.

But their greateſt diſtinction ariſes from their manner of bringing forth their young. Firſtly, ſome of them are viviparous. Secondly, ſome are oviparous; and which may be conſidered in three diſtinct ways. Thirdly, ſome bring forth ſmall ſpawn, like fiſhes. The Crocodile, the Iguana, and all the largeſt kinds, bring forth eggs, which are hatched by the heat of the ſun; the animals that iſſue from them are complete upon leaving the ſhell; and their firſt efforts are to run to ſeek food in their proper element. The viviparous kinds, in which are all the ſalamanders, come forth alive from the body of the female, perfect and active, and ſuffer no ſucceeding change. But thoſe which are bred in the water, and, as we have reaſon to think, from ſpawn, ſuffer a very conſiderable change in their form. They are produced with an external ſkin or covering, that ſometimes encloſes their feet, and gives them a ſerpentine appearance. To this falſe ſkin fins are added, above and below the tail, that ſerve the animal for ſwimming; but when the falſe ſkin drops off, theſe drop off alſo; and then the lizard, with its four feet, is completely formed, and forſakes the water.

From hence it appears, that of this tribe there are three diſtinct kinds, differently produced, and moſt probably very different in their formation. But the hiſtory of theſe animals is very obſcure; and we are as yet incapable of laying the line that ſeparates them. All we know, as was ſaid before, is, that the great animals of this kind are *moſtly* produced perfect from the egg; the ſalamanders are *generally* viviparous; and *ſome* of the water lizards imperfectly produced. In all theſe moſt unfiniſhed productions of Nature, if I may ſo call them, the varieties in their ſtructure increaſes in proportion to their imperfections. A poet would ſay, that Nature grew tired of the nauſeous formation; and left accident to finiſh the reſt of her handy-work.

However, the three kinds have many points of ſimilitude; and, in all their varieties of figure, colour, and production, this tribe is eaſily diſtinguiſhed, and ſtrongly marked. They have all four ſhort legs; the two fore-feet ſomewhat reſembling a man's hand and arm. They have tails almoſt as thick as the body at the beginning, and that generally run tapering to a point. They are all amphibious alſo; equally capable of living upon land and water; and formed internally in the ſame manner with a tortoiſe, and other animals, that can continue a long time without reſpiration: in other words, their lungs are not ſo neceſſary to continue life and circulation, but that their play may be ſtopped for ſome conſiderable time, while the blood performs its circuit round the body by a ſhorter communication.

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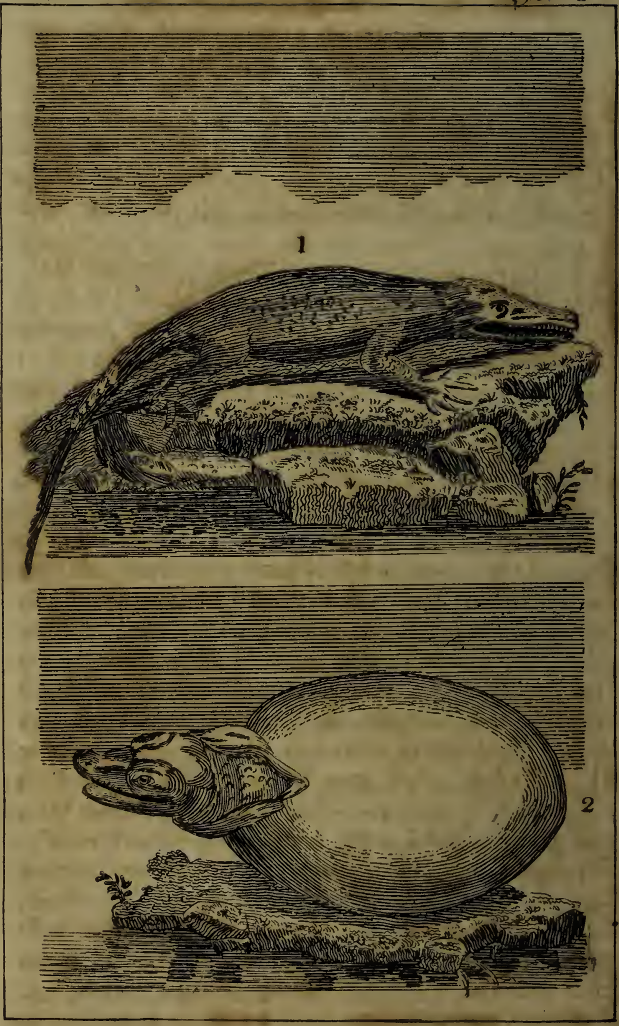

1 The Crocodile P 95
2 The Crocodiles Egg P 103

Theſe are differences that ſufficiently ſeparate lizards from all other animals; but it will be very difficult to fix the limits that diſtinguiſh the three kinds from each other. The *crocodile* tribe, and its affinities, are ſufficiently diſtinguiſhed from all the reſt, by their ſize and fierceneſs; the *ſalamander* tribe is diſtinguiſhed by their deformity, their frog-like heads, the ſhortneſs of their ſnouts, their ſwolen belly, and their viviparous production. With regard to the reſt, which we may denominate the cameleon or lizard kind, ſome of which bring forth from the egg, and ſome of which are imperfectly formed from ſpawn, we muſt groupe them under one head, and leave time to unravel the reſt of their hiſtory.

CHAP. II.

OF THE CROCODILE AND ITS AFFINITIES.

THE Crocodile is an animal placed at a happy diſtance from the inhabitants of Europe, and formidable only in thoſe regions where men are ſcarce, and arts are but little known. In all the cultivated and populous parts of the world, the great animals are entirely baniſhed, or rarely ſeen. The appearance of ſuch raiſes at once a whole country up in arms to oppoſe their force; and their lives generally pay the forfeit of their temerity. The crocodile, therefore, that was once ſo terrible along the banks of the river Nile, is now neither ſo large, nor its numbers ſo great as formerly. The arts of mankind have, through a courſe of ages, powerfully operated to its deſtruction; and, though it is ſometimes ſeen, it appears comparatively timorous and feeble.

To look for this animal in all its natural terrors, grown to an enormous ſize, propagated in ſurpriſing numbers, and committing unceaſing devaſtations, we muſt go to the uninhabited regions of Africa and America, to thoſe immenſe rivers that roll through extenſive and deſolate kingdoms, where arts have never penetrated, where force only makes diſtinction, and the moſt powerful animals exert their ſtrength with confidence and ſecurity. Thoſe that ſail up the river Amazons, or the river Niger, well know how numerous and terrible thoſe animals are in ſuch parts of the world.—In both theſe rivers, they are found from eighteen to twenty-ſeven feet long; and ſometimes lying as cloſe to each other, as a raft of timber upon one of our ſtreams. There they indolently baſk on the ſurface, no way diſturbed at the approach of an enemy, ſince, from the repeated trials of their ſtrength, they found none that they were not able to ſubdue.

Of this terrible animal there are two kinds; the Crocodile, properly ſo called, and the Cayman or Alligator. Travellers, however, have rather made the diſtinction than Nature; for in the general outline, and in the nature of theſe two animals they are entirely the ſame. It would be ſpeaking more properly to call theſe animals the Crocodiles of the eaſtern and the weſtern world; for in books of voyages, they are ſo entirely confounded together, that there is no knowing whether the Aſiatic animal be the crocodile of Aſia, or the alligator of the weſtern world. The diſtinctions uſually made between the crocodile and alligator are theſe: the body of the crocodile is more ſlender than that of the alligator; its ſnout runs off tapering from the forehead, like that of a greyhound; while that of the other is indented, like the noſe of a lap-dog. The crocodile has a much wider ſwallow, and is of an aſh-colour; the alligator is black, varied with white, and is thought not to be ſo miſchievous. All theſe diſtinctions, however, are very ſlight, and can be reckoned little more than minute variations.

This animal grows to a great length, being ſometimes found thirty feet long, from the tip of the ſnout to the end of the tail: its moſt uſual length, however, is eighteen.—One which was diſſected by the Jeſuits at Siam, was of the latter dimenſions; and as the deſcription which is given of it, both externally and internally, is the moſt accurate known of this noted animal, I muſt beg leave to give it as I find it, though ſomewhat tedious. It was eighteen feet and a half, French meaſure, in length; of which the tail was no leſs than five feet and a half, and the head and neck above two feet and a half. It was four feet nine inches in circumference, where thickeſt. The fore legs had the ſame parts and conformation as the arms of a man, both within and without. The hands, if they may be ſo called, had five fingers; the two laſt of which had no nails, and were of a conical figure. The hinder legs, including the thigh and paw, were two feet two inches long; the paws, from the joint to the extremity of the longeſt claws, were above nine inches; they were divided into four toes, of which three were armed with large claws, the longeſt of which was an inch and a half; theſe toes were united by a membrane, like thoſe of a duck, but much thicker. The head was long, and had a little riſing at the top; but the reſt was flat, and eſpecially towards the extremity of the jaws. It was covered by a ſkin, which adhered firmly to the ſkull and to the jaws. The ſkull was rough and unequal in ſeveral places; and about the middle of the forehead there were two bony creſts, about two inches high: the ſkull between theſe two creſts was proof againſt a muſquet-ball; for it only rendered the part a little white that it ſtruck againſt. The eye was very ſmall, in proportion to the reſt of the body, and was ſo placed within its orbit, that the outward part, when the lid was cloſed, was only an inch long, and the line running parallel to the opening of the jaws. It was covered with a double lid, one within and one without: that within, like the nictitating membrane in birds, was folded in the great corner of the eye, and had a motion towards the tail, but being tranſparent, it covered the eye without hindering the ſight. The iris was very large in proportion to the globe of the eye, and was of a yellowiſh grey colour. Above the eye the ear was placed, which opened from above downwards, as if it were by a kind of ſpring, by means of a ſolid, thick cartilaginous ſubſtance. The noſe was placed in the middle of the upper jaw, near an inch from its extremity, and was perfectly round and flat, being near two inches in diameter, of a black, ſoft, ſpongy ſubſtance, not unlike the noſe of a dog. The jaws ſeemed to ſhut one within another; and nothing can be more falſe than that the animal's under jaw is without motion; it moves, like the lower jaw in all other animals, while the upper is fixed to the ſkull and abſolutely immovable. The animal had twenty-ſeven cutting teeth in the upper jaw, and fifteen in the lower, with ſeveral void ſpaces between them: they were thick at the bottom, and ſharp at the point, being all of different ſizes, except ten large hooked ones, ſix of which were in the lower jaw, and four in the upper. The mouth was fifteen inches in length, and eight and a half in breadth, where broadeſt. The diſtance of the two jaws, when opened as wide as they could be, was, fifteen inches and a half: this is a very wide yawn, and could eaſily enough take in the body of a man. The colour of the body was of a dark brown on the upper part, and of a whitiſh citron below, with large ſpots of both colours on the ſides. From the ſhoulders to the extremity of the tail, the animal was covered with large ſcales, of a ſquare form, diſpoſed like parallel girdles, and fifty-two in number; but thoſe near the tail were not ſo thick as the reſt. The creature was covered not only with theſe, but all over with a coat of armour; which, however, was not proof againſt a muſquet-ball, contrary to what has been commonly aſſerted: however, it muſt be confeſſed, that the attitude in which the animal was placed, might contribute to render the ſkin more penetrable; for probably if the ball had ſtruck obliquely againſt the ſhell, it would have flown off. Thoſe parts of the girdles underneath the belly were of a whitiſh colour, and were made up of ſcales of divers ſhapes, but not ſo hard as thoſe on the back.

With reſpect to the internal parts of the animal, the gullet was large in proportion to the mouth; and a ball of wood, as large as one's head, readily ran down, and was drawn up again. The guts were but ſhort, in compariſon, being not ſo long as the animal's body. The tongue, which ſome have erroneouſly aſſerted this animal was without, conſiſted of a thick, ſpongy, ſoft fleſh, and was ſtrongly connected to the lower jaw. The heart was of the ſize of a calf's, of a bright red colour, the blood paſſing as well from the veins to the aorta as into the lungs. There was no bladder; but the kidneys ſent the urine to be diſcharged by the anus. There were ſixty-two joints in the back-bone, which, though very cloſely united, had ſufficient play to enable the animal to bend like a bow to the right and the left; ſo that what we hear of eſcaping the creature by turning out of the right line, and of the animal's not being able to wheel readily after its prey, ſeems to be fabalous. It is moſt likely the crocodile can turn with eaſe, for the joints of its back are not ſtiffer than thoſe of other animals which we know by experience can wheel about very nimbly for their ſize.

Such is the figure and conformation of this formidable animal, that unpeoples countries, and makes the moſt navigable rivers deſert and dangerous. They are ſeen, in ſome places, lying for whole hours, and even days, ſtretched in the ſun, and motionleſs; ſo that one not uſed to them, might miſtake them for trunks of trees, covered with a rough and dry bark; but the miſtake would ſoon be fatal, if not prevented: for the torpid animal, at the near approach of any living thing, darts upon it with inſtant ſwiftneſs, and at once drags it down to the bottom. In the times of an inundation, they ſometimes enter the cottages of the natives, where the dreadful viſitant ſeizes the firſt animal it meets with. There have been ſeveral examples of their taking a man out of a canoe in the ſight of his companions, without their being able to lend him any aſſiſtance.

The ſtrength of every part of the crocodile is very great; and its arms, both offenſive and defenſive, irreſiſtible. We have ſeen, from the ſhortneſs of its legs, the amazing ſtrength of the tortoiſe: but what is the ſtrength of ſuch an animal, compared to that of the crocodile, whoſe legs are very ſhort, and whoſe ſize is ſo ſuperior. The back-bone is jointed in the firmeſt manner; the muſcles of the fore and hinder legs are vigorous and ſtrong; and its whole form calculated for force. Its teeth are ſharp, numerous, and formidable; its claws are long and tenacious; but its principal inſtrument of deſtruction is the tail; with a ſingle blow of this it has often overturned a canoe, and ſeized upon the poor ſavage its conductor.

Though not ſo powerful, yet it is very terrible even upon land. The crocodile ſeldom, except when preſſed by hunger, or with a view of depoſiting its eggs, leaves the water. Its uſual method is to float along upon the ſurface and ſeize whatever animals come within its reach; but when this method fails, it then goes cloſer to the bank. Diſappointed of its fiſhy prey, it there waits covered up among the ſedges, in patient expectation of ſome land animal that comes to drink; the dog, the bull, the tiger, or man himſelf. Nothing is to be ſeen of the inſidious deſtroyer as the animal approaches; nor is its retreat diſcovered, till it be too late for ſafety. It ſeizes the victim with a ſpring, and goes at a bound much faſter than ſo unwieldy an animal could be thought capable of exerting; then having ſecured the creature with both teeth and claws, it drags it into the water, inſtantly ſinks with it to the bottom, and, in this manner, quickly drowns it.

Sometimes it happens that the creature the crocodile has thus ſurpriſed eſcapes from its graſp wounded, and makes off from the river-ſide. In ſuch a caſe, the tyrant purſues with all its force, and often ſeizes it a ſecond time; for, though ſeemingly heavy, the crocodile runs with great celerity. In this manner it is ſometimes ſeen above half a mile from the bank, in purſuit of an animal wounded beyond the power of eſcaping, and then dragging it back to the river-ſide, where it feaſts in ſecurity.

It often happens, in its depredations along the bank, that the crocodile ſeizes on a creature as formidable as itſelf, and meets with a moſt deſperate reſiſtance. We are told of frequent combats between the crocodile and the tiger. All creatures of the tiger kind are continually oppreſſed by a parching thirſt that keeps them in the vicinity of great rivers, whither they deſcend to drink very frequently. It is upon theſe occaſions that they are ſeized by the crocodile; and they die not unrevenged. The inſtant they are ſeized upon, they turn with the greateſt agility, and force their claws into the crocodile's eyes, while he plunges with his fierce antagoniſt into the river. There they continue to ſtruggle for ſome time, till at laſt the tiger is drowned.

In this manner the crocodile ſeizes and deſtroys all animals, and is equally dreaded by all. There is no animal but man alone that can combat it with ſucceſs. We are aſſured by Labat, that a Negro, with no other weapons than a knife in his right hand, and his left arm wrapped round with a cow-hide, ventures boldly to attack this animal in its own element. As ſoon as he approaches the crocodle, he preſents his left arm which the animal ſwallows moſt greedily; but ſticking in its throat, the Negro has time to give it ſeveral ſtabs under the throat; and the water alſo getting in at the mouth, which is held involuntarily open, the creature is ſoon bloated up as big as a tun, and expires.

To us who live at a diſtance from the rapacity of theſe animals, theſe ſtories appear ſtrange, and yet moſt probably are true. From not having ſeen any thing ſo formidable or bold in the circle of our own experience, we are not to determine upon the wonderful tranſactions in diſtant climates. It is probable that theſe, and a number of more dreadful encounters, happen every day among thoſe foreſts and in thoſe rivers where the moſt formidable animals are known to reſide; where the elephant and the rhinoceros, the tiger and the hippopotamos, the ſhark and the crocodile, have frequent opportunities of meeting, and every day of renewing their engagements.

Whatever be the truth of theſe accounts, certain it is that crocodiles are taken by the Siameſe in great abundance. The natives of that empire ſeem particularly fond of the capture of all the great animals with which their country abounds. We have already ſeen their ſucceſs in taking and taming the elephant; nor are they leſs powerful in exerting their dominion over the crocodile. The manner of taking it in Siam, is by throwing three or four ſtrong nets acroſs a river, at proper diſtances from each other; ſo that if the animal breaks through the firſt, it may be caught by one of the reſt. When it is firſt taken it employs the tail, which is the grand inſtrument of ſtrength, with great force; but, after many unſucceſsful ſtruggles, the animal's ſtrength is at laſt exhauſted. Then the natives approach their priſoner in boats, and pierce him with their weapons in the moſt tender parts till he is weakened with the loſs of blood. When he has done ſtirring, they begin by tying up his mouth, and, with the ſame cord, they faſten his head to the tail, which laſt they bend back like a bow. However, they are not yet perfectly ſecure from his fury; but, for their greater ſafety, they tie his fore-feet, as well as thoſe behind, to the top of his back. Theſe precautions are not uſeleſs; for if they were to omit them, the crocodile would ſoon recover ſtrength enough to do a great deal of miſchief.

The crocodile, thus brought into ſubjection, or bred up young, is uſed to divert and entertain the great men of the Eaſt. It is often managed like a horſe; a curb is put into its mouth, and the rider directs it as he thinks proper. Tho' awkwardly formed, it does not fail to proceed with ſome degree of ſwiftneſs; and is thought to move as faſt as ſome of the moſt unwieldy of our own animals, the hog or the cow. Some, indeed, aſſert, that no animal could eſcape it, but for its difficulty in turning; but to this reſource we could wiſh none would truſt who are ſo unhappy as to find themſelves in danger.

Along the rivers of Africa this animal is ſometimes taken in the ſame manner as the ſhark. Several Europeans go together in a large boat, and throw out a piece of beef upon a hook and ſtrong fortified line, which the crocodile ſeizing and ſwallowing, is drawn along, floundering and ſtruggling until its ſtrength is quite exhauſted, when it is pierced in the belly, which is its tendereſt part; and thus, after numberleſs wounds is drawn aſhore. In this part of the world, alſo, as well as at Siam, the crocodile makes an object of ſavage pomp near the palaces of their monarchs. Philips informs us, that Sabi, on the ſlave coaſt, there are two pools of water, near the royal palace, where crocodiles are bred, as we breed carp in our ponds in Europe.

Hitherto I have been deſcribing the crocodile as it is found in unpeopled countries, and undiſturbed by frequent encounters with mankind. In this ſtate it is fierce and cruel, attacking every object that ſeems endued with motion: but in Egypt and other countries long peopled, where the inhabitants are civilized, and the rivers frequented, this animal is ſolitary and fearful. So far from coming to attack a man, it ſinks at his approach with the utmoſt precipitation; and, as if ſenſible of ſuperior power, ever declines the engagement. We have ſeen more than one inſtance in Animated Nature of the contempt which at firſt the lower orders of the creation have for man, till they have experienced his powers of deſtruction. The lion and the tiger among beaſts, the whale among fiſhes, the albatroſs and the penguin among birds, meet the firſt encounters of man without dread or apprehenſion; but they ſoon learn to acknowledge his ſuperiority; and take refuge from his power in the deepeſt faſtneſſes of Nature. This may account for the different characters which have been given us of the crocodile and the alligator by travellers at different times; ſome deſcribing them as harmleſs and fearful; as ever avoiding the ſight of a man, and preying only upon fiſhes; others ranking them among the deſtroyers of Nature; deſcribing them as furniſhed with ſtrength and impelled by malignity to do miſchief; repreſenting them as the greateſt enemies of mankind, and particularly deſirous of human prey. The truth is, the animal has been juſtly deſcribed by both; being ſuch as it is found in places differently peopled or differently civilized. Wherever the crocodile has reigned long unmoleſted, it is there fierce, bold, and dangerous; wherever it has been haraſſed by mankind, its retreats invaded, and its numbers deſtroyed, it is there timorous and inoffenſive.

In ſome places, therefore, this animal, inſtead of being formidable, is not only inoffenſive, but is cheriſhed and admired. In the river San Domingo, the crocodiles are the moſt inoffenſive animals in Nature; the children play with them, and ride about on their backs; they even beat them ſometimes without receiving the ſmalleſt injury. It is true the inhabitants are very careful of this gentle breed, and conſider them as harmleſs domeſtics.

It is probable that the ſmell of muſk, which all theſe animals exhale, may render them agreeable to the ſavages of that part of Africa. They are often known to take the part of this animal which contains the muſk, and wear it as a perfume about their perſons. Travellers are not agreed in what part of the body theſe muſk-bags are contained; ſome ſay in the ears; ſome in the parts of generation; but the moſt probable opinion is, that this muſky ſubſtance is amaſſed in glands under the legs and arms. From whatſoever part of the body this odour proceeds, it is very ſtrong and powerful, tincturing the fleſh of the whole body with its taſte and ſmell. The crocodile's fleſh is at beſt very bad, tough eating; but unleſs the muſk-bags be ſeparated, it is inſupportable. The Negroes themſelves cannot well digeſt the fleſh; but then, a crocodile's egg is to them the moſt delicate morſel in the world. Even ſavages exhibit their epicures as well as we; and one of true taſte will ſpare neither pains nor danger to furniſh himſelf with his favourite repaſt. For this reaſon, he often watches the places where the female comes to lay her eggs, and, upon her retiring, ſeizes the booty.

All crocodiles breed near freſh waters, and though they are ſometimes found in the ſea, yet that may be conſidered rather as a place of excurſion than abode. They produce their young by eggs, as was ſaid above; and for this purpoſe the female, when ſhe comes to lay, chooſes a place by the ſide of a river, or ſome freſh-water lake to depoſit her brood in. She always pitches upon an extenſive, ſandy ſhore, where ſhe may dig a hole without danger of detection from the ground being freſh turned up. The ſhore muſt alſo be gentle and ſhelving to the water, for the greater convenience of the animal's going and returning; and a convenient place muſt be found near the edge of the ſtream, that the young may have a ſhorter way to go. When all theſe requiſites are adjuſted, the animal is ſeen cautiouſly ſtealing upon ſhore to depoſit her burthen. The preſence of a man, a beaſt, or even a bird, is ſufficient to deter her at that time; and if ſhe perceives any creature looking on, ſhe infallibly returns. If, however, nothing appears, ſhe then goes to work, ſcratching up the ſand with her fore-paws, and making a hole pretty deep in the ſhore. There ſhe depoſits from eighty to a hundred eggs, of the ſize of a tennis-ball, and of the ſame figure, covered with a tough, white, ſkin-like parchment. She takes above an hour to perform this taſk; and then covering up the place ſo artfully that it can ſcarcely be perceived, ſhe goes back to return again the next day.—Upon her return, with the ſame precaution as before, ſhe lays about the ſame number of eggs; and the day following, alſo, a like number. Thus having depoſited her whole quantity, and having covered them cloſe up in the ſand, they are ſoon vivified by the heat of the ſun; and at the end of thirty days, the young ones begin to break open the ſhell. At this time the female is inſtinctively taught that her young ones want relief; and ſhe goes upon land to ſcratch away the ſand and ſet them free. Her brood quickly avail themſelves of their liberty; a part run unguided to the water; another part aſcend the back of the female, and are carried thither in greater ſafety. But the moment they arrive at the water, all natural connexion is at an end: when the female has introduced her young to their natural element, not only ſhe, but the male, become among the number of their moſt formidable enemies, and devour as many of them as they can. The whole brood ſcatters into different parts at the bottom; by far the greateſt number are deſtroyed, and the reſt find ſafety in their agility or minuteneſs.

But it is not the crocodile alone that is thus found to thin their numbers; the eggs of this animal are not only a delicious feaſt to the ſavage, but are eagerly ſought after by every beaſt and bird of prey. The ichneumon was erected into a deity among the ancients for its ſucceſs in deſtroying the eggs of theſe monſters: at preſent that ſpecies of the vulture called the Gallinazo is their moſt prevailing enemy. All along the banks of great rivers, for thouſands of miles, the crocodile is ſeen to propagate in numbers that would ſoon overrun the earth, but for the vulture, that ſeems appointed by Providence to abridge its fecundity. Theſe birds are ever found in greateſt numbers where the crocodile is moſt numerous; and, hiding themſelves within the thick branches of the trees that ſhade the banks of the river, they watch the female in ſilence, and permit her to lay all her eggs without interruption. Then when ſhe has retired, they encourage each other with cries to the ſpoil; and flocking all together upon the hidden treaſure, tear up the eggs, and devour them in a much quicker time than they were depoſited. Nor are they leſs diligent in attending the female while ſhe is carrying her young to the water; for if any one of them happens to drop by the way, it is ſure to receive no mercy.

Such is the extraordinary account given us by late travellers of the propagation of this animal; an account adopted by Linnæus and the moſt learned naturaliſts of the age*.—Yet, if one might argue from the general analogy of Nature, the crocodile's devouring her own young when ſhe gets to the water ſeems doubtful. This may be a ſtory raiſed from the general idea of this animal's rapacious cruelty; when, in fact, the crocodile only ſeems more cruel than other animals, becauſe it has more power to do miſchief. It is probable that it is not more diveſted of parental tenderneſs than other creatures; and I am the more led to think ſo from the peculiar formation of one of the crocodile kind. This is called the Open Bellied Crocodile, and is furniſhed with a falſe belly like the opoſſum, where the young creep out and in, as their dangers or neceſſities require. The crocodile thus furniſhed at leaſt cannot be ſaid to be an enemy to her own young, ſince ſhe thus gives them more than parental protection. It is probable, alſo, that this open bellied crocodile is viviparous, and foſters her young that are prematurely excluded in this ſecond womb, until they come to proper maturity.

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* Ulloa.

How long the crocodile lives we are not certainly informed; if we may believe Ariſtotle, it lives the age of a man; but the ancients ſo much amuſed themſelves in inventing fables concerning this animal, that even truth from them is ſuſpicious. What we know for certain from the ancients is, that among the various animals that were produced to fight in the Amphitheatre at Rome, the combat of the crocodile was not wanting *. Marcus Scaurus produced them living in his unrivalled exhibitions; and the Romans conſidered him as the beſt citizen, becauſe he furniſhed them with the moſt expenſive entertainments. But entertainment at that corrupt time was their only occupation.

CHAP. III.

OF THE SALAMANDER.

THE ancients have deſcribed a lizard that is bred from heat, that lives in the flames, and feeds upon fire as its proper nouriſhment. As they ſaw every other element, the air, the earth, and water inhabited, Fancy was ſet to work to find or make an inhabitant in fire; and thus to people every part of Nature. It will be needleſs to ſay that there is no ſuch animal exiſting; and that, of all others, the modern ſalamander has the ſmalleſt affinity to ſuch an abode.

Whether the animal that now goes by the name of the ſalamander be the ſame with that deſcribed by Pliny, is a doubt with me; but this is not a place for the diſcuſſion.— It is ſufficient to obſerve, that the modern ſalamander is an animal of the lizard kind, and under this name is comprehended a large tribe that all go by the ſame name. There have been not leſs than ſeven ſorts of this animal deſcribed by Seba; and to have ſome idea of the peculiarity of their

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* Plin. lib. viii. c. 26.

figure, if we ſuppoſe the tail of a lizard applied to the body of a frog, we ſhall not be far from preciſion. The common lizard is long, ſmall and taper; the ſalamander, like the frog, has its eyes towards the back of the head; like the frog, its ſnout is round and not pointed, and its belly thick and ſwolen. The claws of its toes are ſhort and feeble; its ſkin rough; and the tongue, unlike that of the ſmalleſt of the lizard kind, in which it is long and forked, is ſhort, and adhering to the under jaw.

But it is not in figure that this animal chiefly differs from the reſt of the lizard tribe; for it ſeems to differ in nature and conformation. In nature it is unlike, being a heavy, torpid animal; whereas the lizard tribe are active, reſtleſs, and ever in motion: in conformation it is unlike, as the ſalamander is produced alive from the body of its parent, and is completely formed the moment of its excluſion. It differs from them alſo in its general reputation of being venomous: however, no trials that have been hitherto made ſeem to confirm the truth of the report.

Not only this, but many others of the lizard tribe are ſaid to have venom; but it were to be wiſhed that mankind, for their happineſs, would examine into the foundation of this reproach. By that means many of them, that are now ſhunned and deteſted, might be found inoffenſive; their figure, inſtead of exciting either horror or diſguſt, would then only tend to animate the general ſcene of Nature; and ſpeculation might examine their manners in confidence and ſecurity. Certain it is, that all of the lizard kind with which we are acquainted in this country, are perfectly harmleſs; and it is equally true that, for a long time, till our prejudices were removed, we conſidered not only the Newt, but the Snake and the Blind-worm, as fraught with the moſt deſtructive poiſon. At preſent we have got over theſe prejudices; and, it is probable, that, if other nations made the ſame efforts for information, it would be found, that the malignity of moſt, if not all, of the lizard tribe, was only in the imagination.

With reſpect to the Salamander, the whole tribe, from the Moron to the Gekko, are ſaid to be venomous to the laſt degree; yet, when experiments have been tried, no arts, no provocations, could excite theſe animals to the rage of bitin

They ſeem timid and inoffenſive, only living upon worms and inſects; quite deſtitute of fangs, like the viper; their teeth are ſo very ſmall, that they are hardly able to inflict a wound. But as the teeth are thus incapable of offending, the people of the countries where they are found have recourſe to a venomous ſlaver, which they ſuppoſe, iſſues from the animal's mouth; they alſo tell us of a venom iſſuing from the claws: even Linnæus ſeems to acknowledge the fact; but thinks it a probable ſuppoſition that this venom may proceed from their urine.

Of all animals, the Gekko is the moſt notorious for its powers of miſchief: yet, we are told by thoſe who load it with that calummy, that it is very friendly to man, and though ſupplied with the moſt deadly virulence, is yet never known to bite. It would be abſurd in us, without experience, to pronounce upon the noxious or inoffenſive qualities of animals; yet it is moſt probable, from an inſpection of the teeth of lizards, and from their inoffenſive qualities in Europe, that the gekko has been unjuſtly accuſed; and that its ſerpent-like figure has involved it in one common reproach with ſerpents.

The ſalamander beſt known in Europe, is from eight to eleven inches long, uſually black, ſpotted with yellow; and when taken in the hand, feeling cold to a great degree.—There are ſeveral kinds. Our Black Water Newt is reckoned among the number. The idle report of its being incomſumable in fire, has cauſed many of theſe poor animals to be burnt; but we cannot ſay as philoſophical martyrs; ſince ſcarce any philoſopher could think it neceſſary to make the experiment. When thrown into the fire, the animal is ſeen to burſt with the heat of its ſituation, and to eject its fluids. We are gravely told, in the Philoſophical Tranſactions, that this is a method the animal takes to extinguiſh the flames!

When examined internally, the ſalamander exhibits little difference from other animals of the lizard kind. It is furniſhed with lungs that ſometimes ſerve for the offices of breathing; with a heart that has its communications open, ſo that the animal cannot eaſily be drowned. The ovary in the female is double the ſize of what it is in others of this tribe; and the male is furniſhed with four teſticuli inſtead of two. But what deſerves particular notice is the manner of this animal's bringing forth its young alive*. "The ſalamander," ſays my author, "begins to ſhew itſelf in ſpring, and chiefly during heavy rains. When the warm weather returns it diſappears; and never leaves its hole, during either great heats or ſevere colds, both which it equally fears.—When taken in the hand, it appears like a lump of ice; it conſequently loves the ſhade, and is found at the feet of old trees ſurrounded with bruſhwood at the bottom. It is fond of running along new ploughed grounds; probable to ſeek for worms, which are its ordinary food. One of theſe," continues my author, "I took alive ſome years ago in a ditch that had been lately made. I laid it at the foot of the ſtairs upon coming home, and there it diſgorged from the throat a *worm* three inches long, that lived for an hour after, though wounded as I ſuppoſe by the teeth of the animal. I afterwards cut up another of theſe lizards, and ſaw not leſs than fifty young ones, reſembling the parent, come from its womb, all alive, and actively running about the room." It were to be wiſhed the author had uſed another word beſide that of *worm;* as we now are in doubt whether he means a real worm, or a young animal of the lizard ſpecies: had he been more explicit, and had it appeared that it was a real young lizard, which I take to be his meaning, we might here ſee a wonder of Nature, brought to the proof which many have aſſerted, and many have thought proper to deny: I mean the refuge which the young of the ſhark, the lizard, and the viper kinds, are ſaid to take, by running down the throat of the parent, and there finding a temporary ſecurity. The fact indeed, ſeems a little extraordinary; and yet it is ſo frequently atteſted by ſome, and even believed by others, whoſe authority is reſpectable, among the number of whom we find Mr. Pennant, that the argument of ſtrangeneſs muſt give way to the weight of authority.

However this be, there is no doubt of the animal's being viviparous, and producing above fifty at a time. They come from the parent in full perfection, and quickly leave her to ſhift for themſelves. Theſe animals, in the lower ranks of Nature, want ſcarce any help when excluded; they ſoon complete the little circle of their education; and in a day or two are capable of practiſing all the arts of ſubſiſtence and evaſion practiſed by their kind.

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* Acta Hafnienſia, ann. 1676. Obſerv. 11. Memoirs de l'Academie Royale de Sciences, tom. iii. part. 3, p. 80.

They are all amphibious, or at leaſt are found capable of ſubſiſting in either element, when placed there: if thoſe taken from land are put into water, they continue there in ſeeming health; and, on the contrary, thoſe taken from the water will live upon land. In water, however, they exhibit a greater variety in their appearance; and what is equally wonderful with the reſt of their hiſtory, during the whole ſpring and ſummer this water-lizard changes its ſkin every fourth or fifth day; and during the winter every fifteen days. This operation they perform by means of the mouth and the claws; and it ſeems a work of no ſmall difficulty and pain. The caſt ſkins are frequently ſeen floating on the ſurface of the water: they are ſometimes ſeen alſo with a part of their old ſkin ſtill ſticking to one of their limbs, which they have not been able to get rid of; and thus, like a man with a boot half drawn, in ſome meaſure crippled in their own ſpoils. This alſo often corrupts, and the leg drops off; but the animal does not ſeem to feel the want of it, for the loſs of a limb to all the lizard kind is but a trifling calamity. They can live ſeveral hours even after the loſs of their head: and for ſome time under diſſection, all the parts of this animal ſeem to retain life: but the tail is the part that longeſt retains its motion. Salt ſeems to be much more efficacious in deſtroying theſe animals, than the knife; for, upon being ſprinkled with it, the whole body emits a viſcous liquor, and the lizard dies in three minutes, in great agonies.

The whole of the lizard kind are alſo tenacious of life in another reſpect, and the ſalamander amongthe number. They ſuſtain the want of food in a ſurpriſing manner. One of them, brought from the Indies, lived nine months, without any other food than what it recieved from licking a piece of earth on which it was brought over*: another was kept by Seba in an empty vial for ſix months, without any nouriſhment; and Redi talks of a large one, brought from Africa, that lived for eight months, without taking any nouriſhment whatever. Indeed, as many of this kind, both ſalamanders and lizards, are torpid, or nearly ſo, during the winter, the loſs of their appetite for ſo long a time is the leſs ſurpriſing.

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* Phil. Tranſ. ann. 1661, N. 21. art. 7.

CHAP. IV.

OF THE CAMELEON, THE IGUANA, AND LIZARDS OF DIFFERENT KINDS.

IT were to be wiſhed that animals could be ſo claſſed, that by the very mentioning their rank, we ſhould receive ſome inſight into their hiſtory. This I have endeavoured in moſt inſtances; but in the preſent chapter all method is totally unſerviceable. Here diſtribution gives no general ideas: for ſome of the animals to be here mentioned, produce by eggs; ſome by ſpawn; and ſome are viviparous. The peculiar manner in propagating in each, is very indiſtinctly known. The Iguana and the Cameleon, we know bring forth eggs; ſome others alſo produce in the ſame manner: but of the reſt, which naturaliſts make amount to above fifty, we have but very indiſtinct information.

In the former diviſions of this tribe, we had to obſerve upon animals, formidable from their ſize, or diſguſting from their frog-like head and appearance; in the preſent diviſion, all the animals are either beautiful to the eye, or grateful the appetite. The lizards, properly ſo called, are beautifully painted and mottled; their frolicſome agility is amuſing to thoſe who are familiar with their appearance; and the great affection which ſome of them ſhew to man, ſhould in ſome meaſure, be repaid with kindneſs. Others, ſuch as the Iguana, though not poſſeſſed of beauty, are very ſerviceable, furniſhing one of the moſt luxurious feaſts the tropical climates can boaſt of. Thoſe treated of before were objects of curioſity, becauſe they were apparently objects of danger: moſt of theſe here mentioned have either uſe or beauty to engage us.

Directly deſcending from the crocodile, we find the Cordyle, the Tockay, and the Tejuguacu, all growing leſs in order, as I have named them. Theſe fill up the chaſm to be found between the crocodile and the African iguana.

The Iguana, which deſerves our notice, is about five feet long, and the body about as thick as one's thigh: the ſkin is covered with ſmall ſcales, like thoſe of a ſerpent; and the back is furniſhed with a row of prickles, that ſtand up, like the teeth of a ſaw: the eyes ſeem to be but half opened, except when the animal is angry, and then they appear large and ſparkling: both the jaws are full of very ſharp teeth, and the bite is dangerous though not venomous, for it never let's looſe till it is killed. The male has a ſkin hanging under his throat, which reaches down to his breaſt; and, when diſpleaſed, he puffs it up like a bladder: he is one third larger and ſtronger than the female; though the ſtrength of either avails them little towards their defence. The males are aſh-coloured, and the females are green.

The fleſh of theſe may be conſidered as the greateſt delicacy of Africa and America; and the ſportſmen of thoſe climates go out to hunt the iguana, as we do in purſuit of the pheaſant or the hare. In the beginning of the ſeaſon, when the great floods of the tropical climates are paſt away, and vegetation ſtarts into univerſal verdure, the ſportſmen are ſeen, with a nooze and a ſtick, wandering along the ſides of the rivers to take the iguana. This animal, though apparently formed for combat, is the moſt harmleſs creature of all the foreſt: it lives among the trees, or ſports in the water, without ever offering to offend: there, having fed upon the flowers of the mahot, and the leaves of the mapou, that grow along the banks of the ſtream, it goes to repoſe upon the branches of the trees that hang over the water. Upon land the animal is ſwift of foot; but when once in poſſeſſion of a tree, it ſeems conſcious of the ſecurity of its ſituation, and never offers to ſtir. There the ſportſman eaſily finds it, and as eaſily faſtens his nooſe round his neck: if the head be placed in ſuch a manner that the nooſe cannot readily be faſtened, by hitting the animal a blow on the noſe with the ſtick, it lifts the head, and offers it in ſome manner to the nooſe. In this manner, and alſo by the tail, the iguana is dragged from the trees, and killed by repeated blows on the head.

The Cameleon is a very different animal; and as the iguana ſatisfies the appetites of the epicure, this is rather the feaſt of the philoſopher. Like the crocodile, this little animal proceeds from an egg; and it alſo nearly reſembles that formidable creature in form: but it differs widely in its ſize and its appetites; being not above eleven inches long, and delighting to ſit upon trees, being afraid of ſerpents, from which it is unable to eſcape on the ground.

The head of a large cameleon is almoſt two inches long; and from thence to the beginning of the tail, four and a half: the tail is five inches long, and the feet two and a half: the thickneſs of the body is different at different times; for ſometimes, from the back to the belly, it is two inches, and ſometimes but one; for it can blow itſelf up, and contract itſelf, at pleaſure. This ſwelling and contraction is not only of the back and belly, but of the legs and tail.

Theſe different tumours do not proceed from a dilatation of the breaſt in breathing, which riſes and falls by turns; but are very irregular, and ſeem adopted merely from caprice. The cameleon is often ſeen, as it were, blown up for two hours together; and then it continues growing leſs and leſs inſenſibly; for the dilatation is always more quick and viſible than the contraction. In this laſt ſtate the animal appears extremely lean; the ſpine of the back ſeems ſharp, and all the ribs may be counted; likewiſe the tendons of the legs and arms may be ſeen very diſtinctly.

This method of puffing itſelf up, is ſimilar to that in pigeons, whoſe crops are ſometimes greatly diſtended with air. The cameleon has a power of driving the air it breathes over every part of the body: however, it only gets between the ſkin and the muſcles; for the muſcles themſelves are never ſwolen. The ſkin is very cold to the touch; and though the animal ſeems ſo lean, there is no feeling the beating of the heart. The ſurface of the ſkin is unequal, and has a grain not unlike ſhagreen, but very ſoft, becauſe each eminence is as ſmooth as if it were poliſhed. Some of theſe little protuberances are as large as a pin's head, on the arms, legs, belly and tail; but on the ſhoulders and head they are of an oval figure, and a little larger: thoſe under the throat are ranged in the form of a chaplet, from the lower lip to the breaſt. The colour of all theſe eminences, when the cameleon is at reſt in a ſhady place, is of a bluiſh grey, and the ſpace between is of a pale red and yellow.

But when the animal is removed into the ſun then comes the wonderful part of its hiſtory. At firſt it appears to ſuffer no change of colour, its greyiſh ſpots ſtill continuing the ſame: but the whole ſurface ſoon ſeems to imbibe the rays of light; and the ſimple colouring of the body changes into a variety of beautiful hues. Wherever the light comes upon the body, it is a tawny brown; but that part of the ſkin on which the ſun does not ſhine, changes into ſeveral brighter colours, pale yellow, or vivid crimſon; which forms ſpots of the ſize of half one's finger: ſome of theſe deſcend from the ſpine half way down the back; and others appear on the ſides, arms, and tail. When the ſun has done ſhining, the original grey colour returns by degrees, and covers all the body. Sometimes the animal becomes all over ſpotted with brown ſpots, of a greeniſh caſt. When it is wrapped up in a white linen cloth for two or three minutes, the natural colour becomes much lighter; but not quite white, as ſome authors have pretended: however, from hence it muſt not be concluded that the cameleon aſſumes the colour of the objects which it approaches; this is entirely an error, and probably has taken it riſe from the continual changes it appears to undergo.

Le Bruyn, in his Voyage to the Levant, has given us a very ample deſcription of the cameleon. During his ſtay at Smyrna, he bought ſeveral of this kind, and, to try how long they could live, kept four of them in a cage, permitting them at times to run about the houſe. The freſh ſea-breeze ſeemed to give them moſt ſpirits and vivacity; they opened their mouths to take it in: he never perceived that they eat any thing, except now and then a fly, which they took half an hour to ſwallow: he obſerved their colour often to change, three or four times ſucceſſively, without being able to find out any cauſe for ſuch alterations: their common colour he found to be grey, or rather a pale mouſe colour; but its moſt frequent changes were into a beautiful green, ſpotted with yellow: ſometimes the animal was marked all over with dark-brown; and this often changed into a lighter brown: ſome colours, however, it never aſſumed, and, contrary to what was ſaid above, he found red to be among the number.

Though our traveller took the utmoſt care, he was unable to preſerve any of them alive above five months; and many of them died in four. When the cameleon changes place, and attempts to deſcend from an eminence, it moves with the utmoſt precaution, advancing one leg very deliberately before the other, ſtill ſecuring itſelf by holding whatever it can graſp by the tail. It ſeldom opens its mouth, except for freſh air; and when that is ſupplied, diſcovers its ſatisfaction by its motions, and the frequent changes of its colour. The tongue is ſometimes darted out after its prey, which is flies; and this is as long as the whole body. The eyes are remarkably little, though they ſtand out of the head: they have a ſingle eye-lid, like a cap with a hole in the middle, through which the ſight of the eye appears, which is of a ſhining brown; and round it there is a little circle of gold colour: but the moſt extraordinary part of their conformation is, that the animal often moves one eye, when the other is entirely at reſt; nay, ſometimes one eye will ſeem to look directly forward, while the other looks backward; and one will look upwards, while the other regards the earth.

To this claſs of lizards, we may refer the Dragon, a moſt terrible animal, but moſt probably not of Nature's formation. Of this death-dealing creature all people have read; and the moſt barbarous countries, to this day, paint it to the imagination in all its terrors, and fear to meet it in every foreſt. It is not enough that Nature has furniſhed thoſe countries with poiſons of various malignity; with ſerpents forty feet long; with elephants, lions, and tigers, to make their ſituation really dangerous; the capricious imagination is ſet at work to call up new terrors; and ſcarce a ſavage is found, that does not talk of winged ſerpents of immoderate length, flying away with the camel or the rhinoceros, or deſtroying mankind by a ſingle glare. Happily, however, ſuch ravagers are no where found to exiſt at preſent; and the whole race of dragons is dwindled down to the Flying Lizard, a little harmleſs creature, that only preys upon inſects, and even ſeems to embelliſh the foreſt with its beauty.

The Flying Lizard of Java perches upon fruit-trees, and feeds upon flies, ants, butterflies, and other ſmall inſects. It is a very harmleſs creature, and does no miſchief in any reſpect. Gentil, in his Voyage round the World, affirms, that he has ſeen theſe lizards, at the iſland of Java, in the Eaſt Indies. He obſerved they flew very ſwiftly from tree to tree; and having killed one, he could not but admire the ſkin, which was painted with ſeveral beautiful colours: it was a foot in length, and had four paws, like the common lizards; but its head was flat, and had a ſmall hole in the middle; the wings were very thin, and reſembled thoſe of a flying fiſh. About the neck were a ſort of wattles, not unlike thoſe of cocks, which gave it no diſagreeable appearance. He intended to have preſerved it, in order to bring it into Europe; but it was corrupted by the heat, before the cloſe of the day: however, they have ſince been brought into England, and are now common enough in the cabinets of the curious.

The laſt animal of the lizard kind that I ſhall mention, is the Chalcidian Lizard of Aldrovandus, very improperly called the Seps, by modern hiſtorians. This animal ſeems to make the ſhade that ſeparates the lizard from the ſerpent race. It has four legs, like the lizard; but ſo ſhort, as to be utterly unſerviceable in walking: it has a long ſlender body, like the ſerpent; and it is ſaid to have the ſerpent's malignity alſo. The fore legs are very near the head; the hind legs are placed far backward; but before and behind they ſeem rather uſeleſs incumbrances, than inſtruments ſerving to aſſiſt the animal in its motions, or in providing for its ſubſiſtence. Theſe animals are found above three feet long, and thick in proportion, with a large head and pointed ſnout. The whole body is covered with ſcales; and the belly is white, mixed with blue. It has four crooked teeth, as alſo a pointed tail, which, however, can inflict no wound. Whether the teeth be ſimilar to the viper's fangs, we are not told; though Volateranus ſays, they are covered with a membrane; by which I am apt to think he means a venom-bag, which is found at the root of the teeth of all ſerpents that are poiſonous. It is viviparous; fifteen young ones having been taken alive out of its belly. Upon the whole, it appears to bear a ſtrong affinity to the viper; and, like that animal, its bite may be dangerous.

BOOK III.

OF SERPENTS, &c.

CHAP. I.

OF SERPENTS IN GENERAL.

WE now come to a tribe that not only their deformity, their venom, their ready malignity but alſo our prejudices, and our very religion, have taught us to deteſt. The ſerpent has from the beginning been the enemy of man; and it has hitherto continued to terrify and annoy him, notwithſtanding all the arts that have been practiſed to deſtroy it. Formidable in itſelf, it deters the invader from the purſuit; and from its figure capable of finding ſhelter in a little ſpace, it is not eaſily diſcovered by thoſe who would venture to try the encounter. Thus poſſeſſed at once of potent arms and inacceſſible or ſecure retreats, it baffles all the arts of man, though never ſo earneſtly bent upon its deſtruction.

For this reaſon, there is ſcarce a country in the world that does not ſtill give birth to this poiſonous brood, that ſeem formed to quell human pride, and repreſs the boaſts of ſecurity. Mankind have driven the lion, the tiger, and the wolf from their vicinity; but the ſnake and the viper ſtill defy their power, and frequently puniſh their inſolence.

Their numbers, however, are thinned by human aſſiduity; and it is poſſible ſome of the kinds are wholly deſtroyed. In none of the countries of Europe are they ſufficiently numerous to be truly terrible; the philoſopher can meditate in the fields without danger, and the lover ſeek the grove without fearing any wounds but thoſe of metaphor. The various malignity that has been aſcribed to European ſerpents of old, is now utterly unknown; there are not above three or four kinds that are dangerous, and their poiſon operates in all in the ſame manner. A burning pain in the part, eaſily removable by timely applications, is the worſt effect that we experience from the bite of the moſt venomous ſerpents of Europe. The drowſy death, the ſtarting of the blood from every pore, the inſatiable and burning thirſt, the melting down the ſolid maſs of the whole form into one heap of putrefaction, theſe are horrors with which we are entirely unacquainted.

But though we have thus reduced theſe dangers, having been incapable of wholly removing them, in other parts of the world they ſtill rage with all their ancient malignity. Nature ſeems to have placed them as centinels to deter mankind from ſpreading too widely, and from ſeeking new abodes till they have thoroughly cultivated thoſe at home. In the warm countries that lie within the tropic, as well as in the cold regions of the north, where the inhabitants are few, the ſerpents propagate in equal proportion. But of all countries, thoſe regions have them in the greateſt abundance where the fields are unpeopled and fertile, and where the climate ſupplies warmth and humidity. All along the ſwampy banks of the river Niger or Oroonoko, where the ſun is hot, the foreſts thick, and the men but few, the ſerpents cling among the branches of the trees in infinite numbers, and carry on an unceaſing war againſt all other animals in their vicinity. Travellers have aſſured us that they have often ſeen large ſnakes twining round the trunk of a tall tree, encompaſſing it like a wreath, and thus riſing and deſcending at pleaſure. In theſe countries, therefore, the ſerpent is too formidable to become an object of curioſity, for it excites much more violent ſenſations.

We are not, therefore, to reject as wholly fabulous, the accounts left us by the ancients of the terrible devaſtations committed by a ſingle ſerpent. It is probable, in early times, when the arts were little known, and mankind were but thinly ſcattered over the earth, that ſerpents, continuing undiſturbed poſſeſſors of the foreſt, grew to an amazing magnitude; and every other tribe of animals fell before them. It then might have happened, that ſerpents reigned the tyrants of a diſtrict for centuries together. To animals of this kind, grown by time and rapacity to a hundred or a hundred and fifty feet in length, the lion, the tiger, and even the elephant itſelf, were but feeble opponents. The dreadful monſter ſpread deſolation round him; every creature that had life was devoured, or fled to a diſtance. That horrible *fœtor* which even the commoneſt and the moſt harmleſs ſnakes are ſtill found to diffuſe, might, in theſe larger ones, become two powerful for any living being to withſtand; and while they preyed without diſtinction, they might thus alſo have poiſoned the atmoſphere around them. In this manner, having for ages lived in the hidden and unpeopled foreſt, and finding, as their appetites were more powerful, the quantity of their prey decreaſing, it is poſſible they might venture boldly from their retreats, into the more cultivated parts of the country, and carry conſternation among mankind, as they had before deſolation among the lower ranks of nature. We have many hiſtories of antiquity, preſenting us ſuch a picture; and exhibiting a whole nation ſinking under the ravages of a ſingle ſerpent. At that time man had not learned the art of uniting the efforts of many, to effect one great purpoſe. Oppoſing multitudes only added new victims to the general calamity, and increaſed mutual embarraſſment and terror. The animal was therefore to be ſingly oppoſed by him who had the greateſt ſtrength, the beſt armour, and the moſt undaunted courage. In ſuch an encounter, hundreds muſt have fallen; till one, more lucky than the reſt, by a fortunate blow, or by taking the monſter in its torpid interval, and ſurcharged with ſpoil, might kill, and thus rid his country of the deſtroyer. Such was the original occupation of heroes; and thoſe who firſt obtained that name, from their deſtroying the ravagers of the earth, gained it much more deſervedly than their ſucceſſors, who acquired their reputation only for their ſkill in deſtroying each other. But as we deſcend into more enlightened antiquity, we find theſe animals leſs formidable, as being attacked in a more ſucceſsful manner. We are told, that while Regulus led his army along the banks of the river Bagrada in Africa, an enormous ſerpent diſputed his paſſage over. We are aſſured by Pliny, who ſays that he himſelf ſaw the ſkin, that it was a hundred and twenty feet long, and that it had deſtroyed many of the army. At laſt, however, the battering engines were brought out againſt it; and theſe aſſailing it at a diſtance, it was ſoon deſtroyed. Its ſpoils were carried to Rome, and the general was decreed an ovation for its ſucceſs. There are, perhaps, few facts better aſcertained in hiſtory than this: an ovation was a remarkable honour; and was given only for ſome ſignal exploit, that did not deſerve a triumph: no hiſtorian would offer to invent that part of the ſtory at leaſt, without being ſubject to the moſt ſhameful detection. The ſkin was kept for ſeveral years after in the Capitol; and Pliny ſays, he ſaw it there: now, though Pliny was a credulous writer, he was by no means a *falſe* one; and whatever he ſays he has ſeen, we may very ſafely rely on. At preſent, indeed, ſuch ravages from ſerpents are ſcarce ſeen in any part of the world; not but that in Africa and America, ſome of them are powerful enough to brave the aſſaults of men to this day.

But happily for us, we are placed at ſuch a diſtance as to take a view of this tribe, without fearing for our ſafety; we can ſurvey their impotent malignity with the ſame delight with which the poet deſcribes the terrors of a dead monſter.

> Nequeant expleri corda tuendo
> Terribiles oculos villoſaque ſetis pectore.

To us their ſlender form, their undulating motion, their vivid colouring, their horrid ſtench, their forky tongue, and their envenomed fangs, are totally harmleſs; and in this country their uſes even ſerve to counterbalance the miſchief they ſometimes occaſion.

If we take a ſurvey of ſerpents in general, they have marks by which they are diſtinguiſhed from all the reſt of animated nature. They have the length and the ſuppleneſs of the eel, but want fins to ſwim with; they have the ſcaly covering and pointed tail of the lizard, but they want legs to walk with; they have the crawling motion of the worm, but, unlike that animal, they have lungs to breathe with: like all the reptile kind, they are reſentful when offended; and Nature has ſupplied them with terrible arms to revenge every injury.

Though they are poſſeſſed of very different degrees of malignity, yet they are all formidable to man, and have a ſtrong ſimilitude of form to each other; and it will be proper to mark the general characters before we deſcend to particulars. With reſpect to their conformation, all ſerpents have a very wide mouth, in proportion to the ſize of the head; and what is very extraordinary, they can gape and ſwallow the head of another animal which is three times as big as their own. I have ſeen a toad taken out of the belly of a ſnake, at Lord Spencer's, near London, the body of which was thrice the diameter of the animal that ſwallowed it. However, it is no way ſurpriſing that the ſkin of the ſnake ſhould ſtretch to receive ſo large a morſel; the wonder ſeems how the jaws could take it in. To explain this, it muſt be obſerved that the jaws of this animal do not open as ours, in the manner of a pair of hinges, where bones are applied to bones and play upon one another; on the contrary, the ſerpent's jaws are held together at the roots by a ſtretching muſcular ſkin; by which means they open as widely as the animal chooſes to ſtretch them, and admit of a prey much thicker than the ſnake's own body. The throat, like ſtretching leather, dilates to admit the morſel; the ſtomach receives it in part; and the reſt remaining in the gullet, putrefaction and the juices of the ſerpent's body unite to diſſolve it.

As to the teeth, I will talk more of them when I come to treat of the viper's poiſon; it will be ſufficient here to obſerve, that ſome ſerpent's have fangs, or canine teeth, and others are without them. The teeth in all are crooked and hollow; and, by a peculiar contrivance, are capable of being erected or depreſſed at pleaſure.

The eyes of all ſerpents are ſmall, if compared to the length of the body; and though differently coloured in different kinds, yet the appearance of all is malign and heavy; and from their known qualities, they ſtrike the imagination with the idea of a creature meditating miſchief. In ſome, the upper eye-lid is wanting, and the ſerpent winks only with that below; in others, the animal has a nictitating membrane or ſkin, reſembling that which is found in birds, which keeps the eye clean and preſerves the ſight. The ſubſtance of the eye in all is hard and horny; the cryſtalline humour occupying a great part of the globe.

The holes for hearing are very viſible in all: but there are no conduits for ſmelling; though it is probable that ſome of them enjoy that ſenſe in tolerable perfection.

The tongue in all theſe animals is long and forky. It is compoſed of two long fleſhy ſubſtances, which terminate in ſharp points, and are very pliable. At the root it is connected very ſtrongly to the neck by two tendons, that give a variety of play. Some of the viper kind have tongues a fifth part of the length of their bodies; they are continually darting them out, but they are entirely harmleſs, and only terrify thoſe who are ignorant of the real ſituation of their poiſon.

If from the jaws we go on to the gullet, we ſhall find it very wide for the animal's ſize, and capable of being diſtended to a great degree; at the bottom of this lies the ſtomach, which is not capacious, and receives only a part of the prey, while the reſt continues in the gullet for digeſtion. When the ſubſtance in the ſtomach is diſſolved into chyle, it paſſes into the inteſtines, and from thence goes to nouriſhment, or to be excluded by the vent.

Like moſt other animals, ſerpents are furniſhed with lungs, which I ſuppoſe are ſerviceable in breathing, though we cannot perceive the manner in which this operation is performed; for though ſerpents are often ſeen apparently to draw in their breath, yet we cannot find the ſmalleſt ſigns of their ever reſpiring it again. Their lungs however are long and large, and doubtleſs are neceſſary to promote their languid circulation. The heart is formed as in the tortoiſe, the frog, and the lizard kinds, ſo as to work without the aſſiſtance of the lungs. It is ſingle, the greateſt part of the blood flowing from the great vein to the great artery by the ſhorteſt courſe. By this contrivance of Nature we eaſily gather two conſequences; that ſnakes are amphibious, being equally capable of living on land and in the water; and, that alſo they are torpid in winter, like the bat, the lizard, and other animals formed in the ſame manner.

The vent in theſe animals ſerves for the emiſion of the urine and the fæces, and for the purpoſes of generation.— The inſtrument of generation in the male is double, being forked like the tongue; the ovaries in the female are double alſo; and the aperture is very large, in order to receive the double inſtrument of the male. They copulate in their retreats; and it is ſaid by the ancients, that in this ſituation they appear like one ſerpent with two heads; but how far this remark is founded in truth, I do not find any of the moderns that can reſolve me.

As the body of this animal is long, ſlender, and capable of bending in ever direction, the number of joints in the back-bone are numerous beyond what one would imagine. In the generality of quadrupeds, they amount to not above thirty or forty; in the ſerpent kind they amount to a hundred and forty-five from the head to the vent, and twenty-five more from that to the tail*. The number of theſe joints muſt give the back-bone a ſurpriſing degree of pliancy; but this is ſtill encreaſed by the manner in which each of theſe joints are locked into the other. In man and quadrupeds, the flat ſurfaces of the bones are laid one againſt the other, and bound tight by ſinews; but in ſerpents the bones play one within the other like ball and ſocket, ſo that they have full motion upon each other in every direction †. Thus if a man were to form a machine compoſed of ſo many joints as are found in the back of a ſerpent, he would find it no eaſy matter to give it ſuch ſtrength and pliancy at the ſame time. The chain of a watch is but a bungling piece of workmanſhip in compariſon.

Though the number of joints in the back-bone is great, yet that of the ribs is ſtill greater; for, from the head to the vent, there are two ribs to every joint, which makes their number two hundred and ninety in all. Theſe ribs are furniſhed with muſcles; four in number; which being inſerted into the head, run along to the end of the tail, and give the animal great ſtrength and agility in all its motions.

The ſkin alſo contributes to its motions, being compoſed of a number of ſcales, united to each other by a tranſparent membrane, which grows harder as it grows older, until the animal changes, which is generally done twice a year. This cover then burſts near the head, and the ſerpent creeps from it, by an undulatory motion, in a new ſkin, much more vivid than the former. If the old ſlough be then viewed, every ſcale will be diſtinctly ſeen, like a piece of net work, and will be found greateſt where the part of the body they covered was largeſt.

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* Vide Charat Anatom. † Derham, p. 396.

There is much geometrical neatneſs in the diſpoſal of the ſerpent's ſcales, for aſſiſting the animal's ſinuous motion. As the edges of the foremoſt ſcales lie over the ends of their following ſcales, ſo thoſe edges, when the ſcales are erected, which the animal has a power of doing in a ſmall degree, catch in the ground, like the nails in the wheel of a chariot, and ſo promote and facilitate the animal's progreſſive motion. The erecting theſe ſcales is by means of a multitude of diſtinct muſcles, with which each is ſupplied, and one end of which is tacked each to the middle of the foregoing.

In ſome of the ſerpent kind there is the exacteſt ſymmetry in theſe ſcales; in others they are diſpoſed more irregularly. In ſome there are larger ſcales on the belly, and often anſwering to the number of ribs; in others, however, the animal is without them. Upon this ſlight difference, Linnæus has founded his diſtinctions of the various claſſes of the ſerpent tribe. Human curioſity, however, and even human intereſt, ſeem to plead for a very different method of diſtribution. It is not the number of ſcales on a formidable animal's belly, nor their magnitude or variety, that any way excite our concern. The firſt queſtion that every man will naturally aſk, when he hears of a ſnake, is, whether it be large: the ſecond, whether it be venomous? In other words, the ſtongeſt lines in the animal's hiſtory are thoſe that firſt excite our attention; and theſe it is every hiſtorian's buſineſs to diſplay.

When we come to compare ſerpents with each other, the firſt great diſtinction appears in their ſize; no other tribe of animals differing ſo widely in this particular. What, for inſtance, can be ſo remotely ſeparated as the Great Liboya of Surinam, that grows to thirty-ſix feet long; and the Little Serpent, at the Cape of Good Hope and the north of the river Senegal, that is not above three inches, and covers whole ſandy deſerts with its multitudes! This tribe of animals, like that of fiſhes, ſeems to have no bounds put to their growth: their bones are in a great meaſure cartilaginous, and they are conſequently capable of great extenſion; the older, therefore, a ſerpent becomes, the larger it grows; and as they ſeem to live to a great age, they arrive at an enormous ſize.

Leguat aſſures us, that he ſaw one in Java, that was fifty feet long. Carli mentions their growing to above forty feet; and we have now the ſkin of one in the Muſæum, that meaſures thirty-two. Mr. Wentworth, who had large concerns in the Brebices in America, aſſures me, that, in that country, they grow to an enormous length. He one day ſent out a ſoldier, with an Indian, to kill wild fowl for the table; and and they accordingly went ſome miles from the fort: in purſuing their game, the Indian, who generally marched before, beginning to tire, went to reſt himſelf upon the fallen trunk of a tree, as he ſuppoſed it to be; but when he was juſt going to ſit down, the enormous monſter began to move, and the poor ſavage perceiving that he had approached a Liboya, the greateſt of all the ſerpent kind, dropped down in an agony. The ſoldier, who perceived at ſome diſtance what had happened, levelled at the ſerpent's head, and, by a lucky aim, ſhot it dead: however, he continued his fire until he was aſſured that the animal was killed; and then going up to reſcue his companion, who was fallen motionleſs by its ſide, he, to his aſtoniſhment, found him dead likewiſe, being killed by the fright. Upon his return to the fort, and telling what had happened, Mr. Wentworth ordered the animal to be brought up, when it was meaſured, and found to be thirty-ſix feet long. He had the ſkin ſtuffed, and then ſent to Europe, as a preſent to the Prince of Orange, in whoſe cabinet it is now to be ſeen at the Hague; but the ſkin has ſhrunk, by drying, two or three feet.

In the Eaſt Indies they grow alſo to an enormous ſize; particularly in the Iſland of Java, where, we are aſſured, that one of them will deſtroy and devour a buffalo. In a letter, printed in the German Ephemerides, we have an account of a combat between an enormous ſerpent and a buffalo, by a perſon, who aſſures us, that he was himſelf a ſpectator. The ſerpent had for ſome time been waiting near the brink of a pool, in expectation of its prey; when a buffalo was the the firſt that offered. Having darted upon the affrighed animal, it inſtantly began to wrap it round with its voluminous twiſtings; and at every twiſt the bones of the buffalo were heard to crack almoſt as loud as the report of a cannon. It was in vain that the poor animal ſtruggled and bellowed; its enormous enemy entwined it too cloſely to get free; till at length, all its bones being maſhed to pieces, like thoſe of a malefactor on the wheel, and the whole body reduced to one uniform maſs, the ſerpent untwined its folds to ſwallow its prey at leiſure. To prepare for this, and in order to make the body ſlip down the throat more glibly, it was ſeen to lick the whole body over, and thus cover it with its mucus. It then began to ſwallow it at that end that offered leaſt reſiſtance; while its length of body was dilated to receive its prey, and thus took in at once a morſel that was three times its own thickneſs.— We are aſſured by travellers, that theſe animals are often found with the body of a ſtag in their gullet, while the horns, which they are unable to ſwallow, keep ſticking out at their mouths.

But it is happy for mankind that the rapacity of theſe frightful creatures is often their puniſhment; for whenever any of the ſerpent kind have gorged themſelves in this manner, whenever their body is ſeen particularly diſtended with food, they then become torpid, and may be approached and deſtroyed with ſafety. Patient of hunger to a ſurpriſing degree, whenever they ſeize and ſwallow their prey, they ſeem, like ſurfeited gluttons, unwieldy, ſtupid, helpleſs, and ſleepy: they at that time ſeek ſome retreat, where they may lurk for ſeveral days together, and digeſt their meal in ſafety: the ſmalleſt effort at that time is capable of deſtroying them; they can ſcarce make any reſiſtance: and they are equally unqualified for flight or oppoſition: that is the happy opportunity of attacking them with ſucceſs: at that time the naked Indian himſelf does not ſuffer to aſſail them. But it is otherwiſe when this ſleepy interval of digeſtion is over; they then iſſue, with famiſhed appetites, from their retreats, and with accumulated terrors, while every animal of the foreſt flies before them.

Carli deſcribes the Long Serpent of Congo, making its tract through the tall graſs, like mowers in a ſummer's day. He could not without terror behold whole lines of graſs lying levelled under the ſweep of its tail. In this manner it moved forward with great rapidity, until it found a proper ſituation frequented by its prey: there it continued to lurk, in patient expectation, and would have remained for weeks together, had it not been diſturbed by the natives.

Other creatures have a choice in their proviſion; but the ſerpent indiſcriminately preys upon all; the buffalo, the tiger, and the gazelle. One would think that the porcupine's quills might be ſufficient to protect it; but whatever has life, ſerves to appeaſe the hunger of theſe devouring creatures: porcupines, with all their quills, have frequently been found in their ſtomachs, when killed and opened; nay, they moſt frequently are ſeen to devour each other.

A life of ſavage hoſtility in the foreſt, offers the imagination one of the moſt tremendous pictures in Nature. In thoſe burning countries, where the ſun dries up every brook for hundreds of miles round; when what had the appearance of a great river in the rainy ſeaſon, becomes, in ſummer, one dreary bed of ſand—in thoſe countries, I ſay, a lake that is never dry, or a brook that is perennial, is conſidered by every animal as the greateſt convenience of Nature. As to food, the luxuriant landſcape ſupplies that in ſufficient abundance: it is the want of water that all animals endeavour to remove; and, inwardly parched by the heat of the climate, traverſe whole deſerts to find out a ſpring. When they have diſcovered this, no dangers can deter them from attempting to ſlake their thirſt. Thus, the neighbourhood of a rivulet, in the heart of the tropical continents, is generally the place where all the hoſtile tribes of Nature draw up for the engagement. On the banks of this little envied ſpot, thouſands of animals of various kinds are ſeen venturing to quench their thirſt, or preparing to ſeize their prey. The elephants are perceived, in a long line, marching from the darker parts of the foreſt; the buffaloes are there, depending upon numbers for ſecurity; the gazelles, relying ſolely upon their ſwiftneſs; the lion and tiger waiting a proper opportunity to ſeize; but chiefly the larger ſerpents are upon guard there, and defend the acceſſes of the lake. Not an hour paſſes without ſome dreadful combat; but the ſerpent, defended by its ſcales, and naturally capable of ſuſtaining a multitude of wounds, is, of all others, the moſt formidable. It is the moſt wakeful alſo; for the whole tribe ſleep with their eyes open, and are, conſequently, for ever upon the watch: ſo that, till their rapacity is ſatisfied, few other animals will venture to approach their ſtation.

But, though theſe animals are, of all others, the moſt voracious, and though the morſel which they ſwallow without chewing, is greater than what any other creature, either by land or water, the whale itſelf not excepted, can devour, yet no animals upon earth bear abſtinence ſo long as they. A ſingle meal, with many of the ſnake kind, ſeems to be the adventure of a ſeaſon; it is an occurrence for which they have been for weeks, nay, ſometimes for months, in patient expectation of. When they have ſeized their prey, their induſtry for ſeveral weeks is entirely diſcontinued; the fortunate capture of an hour, often ſatisfies them for the remaining period of their annual activity. As their blood is colder than that of moſt other terreſtrial animals, and as it circulates but ſlowly through their bodies, ſo their powers of digeſtion are but feeble. Their prey continues, for a long time, partly in the ſtomach, partly in the gullet; and a part is often ſeen hanging out of the mouth. In this manner, it digeſts by degrees; and in proportion as the part below is diſſolved, the part above is taken in. It is not, therefore, till this tedious operation is entirely performed, that the ſerpent renews its appetite and its activity. But ſhould any accident prevent it from iſſuing once more from its cell, it ſtill can continue to bear famine, for weeks, months, nay, for years together. Vipers are often kept in boxes for ſix or eight months, without any food whatever; and there are little ſerpents ſometimes ſent over to Europe from Grand Cairo, the name of which I have not been able to learn, that live for ſeveral years in glaſſes, and never eat at all, nor even ſtain the glaſs with their excrements. Thus the ſerpent tribe unite in themſelves two very oppoſite qualities; wonderful abſtinence, and yet incredible rapacity.

If, leaving the conſideration of their appetites, we come to compare ſerpents as to their voices, ſome are found ſilent, ſome have a peculiar cry, but hiſſing is the ſound which they moſt commonly ſend forth, either as a call to their kind, or as a threat to their enemies. In the countries where they are generally ſilent in the middle of the day, when they are obliged to retire from the heat of the climate; but as the cool of the evening approaches, they are then heard iſſuing from their cells, with continued hiſſings; and ſuch is the variety of their notes, that ſome have aſſured me they very much reſemble the muſic of an Engliſh grove. This ſome will hardly credit—at any rate, ſuch notes, however pleaſing, can give but very little delight, when we call to mind the malignity of the minſtrel. If conſidered, indeed, as they anſwer the animal's own occaſions, they will be found well adapted to its nature, and fully anſwering the purpoſes of terrifying ſuch as would venture to offend it.

With reſpect to motion, ſome ſerpents, particularly thoſe of the viper kind, move ſlowly; while others, ſuch as the Ammodytes, dart with amazing ſwiftneſs. The motion in all is ſimilar; but the ſtrength of body in ſome gives a very different appearance. The viper, that is but a ſlow, feeble-bodied animal, makes way in a heavy, undulating manner; advancing its head, then drawing up its tail behind, and bending the body into a bow; then from the ſpot where the head and tail were united, advancing the head forward as before. This, which is the motion of all ſerpents, is very different from that of the earth-worm or the naked ſnail. The ſerpent, as was ſaid above, has a back-bone, with numerous joints; and this bone the animal has a power of bending in every direction, but without being able to ſhorten or lengthen it at pleaſure. The earth-worm, on the other hand, has no back-bone; but its body is compoſed of rings, which, like a barber's puff, it can lengthen or ſhorten as it finds neceſſary The earth-worm, therefore, in order to move forward, lengthens the body; then, by the fore part clings to the ground, where it has reached, and then contracts and brings up its rear: then, when the body is thus ſhortened, the fore part is lengthened again for another progreſſion; and ſo on. The ſerpent, inſtead of ſhortening the body, bends it into an arch; and this is the principal difference between ſerpentine and vermicular progreſſion.

I have inſtanced this motion in the viper, as moſt eaſily diſcerned; but there are many ſerpents that dart with ſuch amazing ſwiftneſs, that they appear rather to leap than crawl. It is moſt probable, however, that no ſerpent can dart upon even ground farther than its own length at one effort. Our fears, indeed, may increaſe the force of their ſpeed, which is ſometimes found ſo fatal. We are told by ſome, that they will dart to a very great diſtance; but this my inquiries have never been able to aſcertain. The manner of progreſſion in the ſwifteſt ſerpent we know, which is the jaculus, is by inſtantly coiling itſelf upon its tail, and darting from thence to its full extent; then carrying the tail, as quick as lightening, to the head; coiling and darting again: and, by this means, proceeding, with extreme rapidity, without ever quitting the ground. Indeed, if we conſider the length and the weakneſs of the back-bone in all theſe animals; if we regard the make of their vertebræ, in which we ſhall find the junctures all formed to give play, and none to give power; we cannot be of opinion that they have a faculty of ſpringing from the ground, as they entirely want a *fulcrum*, if I may ſo expreſs it, from whence to take their ſpring; the whole body being compoſed of unſupported muſcles and joints that are yielding. It muſt be confeſſed, that they dart down from trees upon their prey; but their weight alone is ſufficient for that purpoſe, without much effort of their own.

Though all ſerpents are amphibious, ſome are much fonder of the water than others; and, though deſtitute of fins or gills, remain at the bottom, or ſwim along the ſurface with great eaſe. From their internal ſtructure, juſt ſketched above, we ſee how well adapted they are for either element; and how capable their blood is of circulating at the bottom, as freely as in the frog or the tortoiſe. They can, however, endure to live in freſh-water only; for ſalt is an effectual bane to the whole tribe. The greateſt ſerpents are moſt uſually found in freſh-water, either chooſing it as their favourite element, or finding their prey in ſuch places in the greateſt abundance. But that all will live and ſwim in liquids appears from the experiment of Rhedi; who put a ſerpent into a large glaſs veſſel of wine, where it lived ſwimming about ſix hours; tho', when it was by force immerſed and kept under that liquid, it lived only one hour and a half. He put another in common water, where it lived three days; but when it was kept under water, it lived only about twelve hours *. Their motion there, however, is perfectly the reverſe of what it is upon land; for, in order to ſupport themſelves upon an element lighter than their bodies, they are obliged to increaſe their ſurface in a very artificial manner, On earth their windings are perpendicular to the ſurface; in water they are parallel to it; in other words, if I ſhould wave my hand up and down, it will give an idea of the animal's progreſs on land; if I ſhould wave it to the right and left, it will give ſome idea of its progreſs on the water.

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* Rhedi Exper. p. 170.

Some ſerpents have a moſt horrible fœtor attending them, which is alone capable of intimidating the brave. This proceeds from two glands near the vent, like thoſe in the weaſel or polecat; and, like thoſe animals, in proportion as they are excited by rage or by fear, the ſcent grows ſtronger. It would ſeem, however, that ſuch ſerpents as are moſt venomous, are leaſt offenſive in this particular; ſince the rattleſnake and the viper have no ſmell whatever: Nay, we are told that at Calecut and Cranganon, in the Eaſt Indies, there are ſome very noxious ſerpents, who are ſo far from being diſagreeable, that their excrements are ſought after, and kept as the moſt pleaſing perfume. The Eſculapian Serpent is alſo of this number.

Some ſerpents bring forth their young alive, as the viper; ſome bring forth eggs, which are hatched by the heat of their ſituation; as the common black ſnake, and the majority of the ſerpent tribe. When a reader, ignorant of anatomy, is told, that ſome of thoſe animals produce their young alive, and that ſome produce eggs only, he is apt to ſuppoſe a very great difference in the internal conformation, which makes ſuch a variety in the manner of bringing forth. But this is not the caſe: theſe animals are internally alike, in whatever manner they produce their young; and the variety in their bringing forth, is rather a ſlight than a real diſcrimination. The only difference is, that the viper hatches her eggs, and brings them to maturity within her body; the ſnake is more premature in her productions, and ſends her eggs into the light, ſome time time before the young ones are capable of leaving the ſhell. Thus, if either are opened, the eggs will be found in the womb, covered with their membranous ſhell, and adhering to each other, like large beads on a ſtring. In the eggs of both young ones will be found, though at different ſtages of maturity: thoſe of the viper will crawl and bite the moment the ſhell that encloſes them is broke open; thoſe of the ſnake are not yet arrived at their perfect form.

Father Labat took a ſerpent of the viper kind, that was nine feet long, and ordered it to be opened in his preſence. He then ſaw the manner in which the eggs of theſe animals lie in the womb. In this creature there were ſix eggs, each of the ſize of a gooſe egg, but longer, more pointed, and covered with a membranous ſkin, by which alſo they were united to each other. Each of theſe eggs contained from thirteen to fifteen young ones, about ſix inches long, and as thick as a gooſe-quill. Tho' the female from whence they were taken was ſpotted, the young ſeemed to have a variety of colours very different from the parent; and this led the traveller to ſuppoſe that the colour was no characteriſtic mark among ſerpents. Theſe little miſchievous animals were no ſooner let looſe from the ſhell, than they crept about, and put themſelves into a threatening poſture, coiling themſelves up and biting the ſtick with which he was deſtroying them. In this manner he killed ſeventy-four young ones; thoſe that were contained in one of the eggs eſcaped at the place where the female was killed, by the burſting of the egg, and their getting among the buſhes.

The laſt diſtinction that I ſhall mention, but the moſt material among ſerpents, is, that ſome are venomous, and ſome inoffenſive. If we conſider the poiſon of ſerpents as it relates to man, there is no doubt but that it is a ſcourge and an affliction The various calamities that the poiſon of ſerpents is capable of producing, are not only inflicted by the animal itſelf, but by men, more miſchievous than even ſerpents, who prepare their venom to deſtroy each other. With this the ſavages poiſon their arms, and alſo prepare their revengeful potions. The ancients were known to preſerve it for the purpoſes of ſuicide; and even among ſemi-barbarous countries at this day, the venom of ſnakes is uſed as a philtre.

But, though the poiſon be juſtly terrible to us, it has been given to very good purpoſes for the animal's own proper ſupport and defence. Without this, ſerpents, of all other animals, would be the moſt expoſed and defenceleſs; without feet for eſcaping a purſuit; without teeth capable of inflicting a dangerous wound, or without ſtrength for reſiſtance; incapable, from their ſize, of finding ſecurity in very ſmall retreats, like the earth-worm, and diſguſting all from their deformity, nothing was left for them but a ſpeedy extirpation. But furniſhed as they are with powerful poiſon, every rank of animals approach them with dread, and never ſeize them but at an advantage. Nor is this all the advantage they derive from it. The malignity of a few ſerves for the protection of all. Though not above a tenth of their number are actually venomous, yet the ſimilitude they all bear to each other excites a general terror of the whole tribe; and the uncertainty of their enemies in which the poiſon chiefly reſides, makes even the moſt harmleſs formidable.—Thus Providence ſeems to have acted with double precaution; it has given ſome of them poiſon for the general defence of a tribe naturally feeble; but it has thinned the numbers of thoſe which are venomous, leſt they ſhould become too powerful for the reſt of Animated Nature.

From theſe noxious qualities in the ſerpent kind, it is no wonder that not only man, but beaſts and birds, carry on an unceaſing war againſt them. The ichneumon of the Indians, and the peccary of America, deſtroy them in great numbers. Theſe animals have the art of ſeizing them near the head; and it is ſaid that they can ſkin them with great dexterity.—The vulture and the eagle alſo prey upon them in great abundance; and often ſouſing down from the clouds, drop upon a long ſerpent, which they ſnatch up ſtruggling and writhing in the air. Dogs alſo are bred up to oppoſe them. Father Feuillée tells us, that being in the woods of Martinico, he was attacked by a large ſerpent, which he could not eaſily avoid, when his dog immediately came to his relief, and ſeized the aſſailant with great courage. The ſerpent entwined him, and preſſed him ſo violently, that the blood came out of his mouth, and yet the dog never ceaſed till he had tore it to pieces. The dog was not ſenſible of his wounds during the fight; but ſoon after his head ſwelled prodigiouſly, and he lay on the ground as dead. But his maſter having found hard by a banana tree, he applied its juice, mixed with treacle to the wounds, which recovered the dog, and quickly healed his ſores.

But it is in man that theſe venomous creatures find the moſt dangerous enemy. The Pſylli of old were famous for charming and deſtroying ſerpents. Some moderns pretend to the ſame art. Caſſaubon ſays, that he knew a man who could at any time ſummon a hundred ſerpents together, and draw them into the fire. Upon a certain occaſion, when one of them bigger than the reſt would not be brought in, he only repeated his charm, and it came forward, like the reſt, to ſubmit to the flames. Philoſtratus deſcribes particularly how the Indians charm ſerpents. "They take a ſcarlet robe, embroidered with golden letters, and ſpread it before a ſerpent's hole. The golden letters have a faſcinating power; and by looking ſtedfaſtly, the ſerpent's eyes are overcome and laid aſleep." Theſe, and many other feats, have been often practiſed upon theſe animals by artful men, who had firſt prepared the ſerpents for their exerciſe, and then exhibited them as adventitiouſly aſſembled at their call. In India there is nothing ſo common as dancing ſerpents, which are carried about in a broad, flat veſſel, ſomewhat reſembling a ſieve. Theſe erect and put themſelves in motion at the word of command. When their keeper ſings a ſlow tune, they ſeem by their heads to keep time; when he ſings a quicker meaſure, they appear to move more briſk and lively. All animals have a certain degree of docility; and we find that ſerpents themſelves can be brought to move and approach at the voice of their maſter. From this trick, ſucceſsfully practiſed before the ignorant, it is moſt probable has ariſen all the boaſted pretenſions which ſome have made to charming of ſerpents; an art to which the native Americans pretend at this very day. One of Linnæus's pupils, we are told, purchaſed the ſecret from an Indian, and then diſcovered it to his maſter; but, like all ſecrets of the kind, it is probable this ended in a few unmeaning words of no efficacy.

Though the generality of mankind regard this formidable race with horror, yet there have been ſome nations, and there are ſome at this day, that conſider them with veneration and regard. The adoration paid by the ancient Egyptians to a ſerpent is well known: many of the nations at preſent along the weſtern coaſt of Africa retain the ſame unaccountable veneration. Upon the gold and ſlave coaſts, a ſtranger, upon entering the cottages of the natives, is often ſurpriſed to ſee the roof ſwarming with ſerpents, that cling there without moleſting and unmoleſted by the natives. But his ſurpriſe will increaſe upon going farther ſouthward to the kingdom of Widah, when he finds that a ſerpent is the god of the country. This animal, which travellers deſcribe as a huge, overgrown creature, has its habitation, its temple, and its prieſts. Theſe impreſs the vulgar with an opinion of its virtues; and numbers are daily ſeen to offer not only their goods, their proviſions, and their prayers, at the ſhrine of their hideous deity, but alſo their wives and daughters.—Theſe the prieſts readily accept of, and after ſome days of penance, return them to their ſuppliants, much benefited by the ſerpent's ſuppoſed embraces. Such a complicated picture of ignorance and impoſture gives no very favourable impreſſions of our fellow-creatures; but we may ſay in defence of Human Nature, that the moſt frightful of reptiles is worſhipped by the moſt uncultivated and barbarous of mankind.

From this general picture of the ſerpent tribe, one great diſtinction obviouſly preſents itſelf; namely, into thoſe that are venomous, and thoſe that are wholly deſtitute of poiſon. To the firſt belong the viper, the rattleſnake, the cobra di capello, and all their affinities: to the other, the common black ſnake, the liboya, the boiguacu, the amphiſbæna, and various others, that, though deſtitute of venom, do not ceaſe to be formidable. I will, therefore, give their hiſtory ſeparately, beginning with the venomous claſs as they have the ſtrongeſt claims to our notice and attention.

CHAP. II.

OF VENOMOUS SERPENTS IN GENERAL.

THE poiſon of ſerpents has been for ages one of the greateſt objects of human conſideration. To us, who ſeldom feel the vengeful wound, it is merely a ſubject of curioſity; but to thoſe placed in the midſt of the ſerpent tribe, who are every day expoſed to ſome new diſaſter, it becomes a matter of the moſt ſerious importance. To remedy the bite of a ſerpent is conſidered among our phyſicians, as one of the ſlighteſt operations in medicine; but among the phyſicians of the Eaſt, the antidotes for this calamity make up the bulk of their diſpenſaries. In our colder climates, the venom does not appear with that inſtantaneous operation which it exhibits in the warmer regions; for either its powers are leſs exquiſite, or our fluids are not carried round in ſuch rapid circulation.

In all countries, however, the poiſon of the ſerpent is ſufficiently formidable to deſerve notice, and to excite our attention to its nature and effects. It will, therefore, in the firſt place be proper to deſcribe its ſeat in the animal, as alſo the inſtrument by which the wound is made, and the poiſon injected. In all this venomous claſs of reptiles, whether the viper, the rattleſnake, or the cobra di capello, there are two large teeth or fangs that iſſue from the upper jaw, and that hang out beyond the lower. The reſt of the ſnake tribe are deſtitute of theſe; and it is moſt probable that wherever theſe fangs are wanting, the animal is harmleſs; on the contrary, wherever they are found it is to be avoided as the moſt peſtilent enemy. Theſe are the inſtruments that ſeem to place the true diſtinction between animals of the ſerpent kind; the wounds which theſe fangs inflict produce the moſt dangerous ſymptoms; the wounds inflicted by the teeth only are attended with nothing more than the ordinary conſequences attending the bite of any other animal. Our firſt great attention, therefore, upon ſeeing a ſerpent ſhould be directed to the teeth. If it has the fang teeth, it is to be placed among the venomous claſs; if it wants them, it may be ſet down as inoffenſive. I am not ignorant that many ſerpents are ſaid to be dangerous whoſe jaws are unfurniſhed with fangs; but it is moſt probable that our terrors only have furniſhed theſe animals with venom; for of all the tribe whoſe teeth are thus formed, not one will be found to have a bag for containing poiſon, nor a conduit for injecting it into the wound. The Black Snake, the Liboya, the Blind Worm, and and a hundred others that might be mentioned, have their teeth of an equal ſize, fixed into the jaws, and with no other apparatus for inflicting a dangerous wound than a dog or a lizard; but it is otherwiſe with the venomous tribe we are now deſcribing; theſe are well furniſhed, not only with an elabaratory where the poiſon is formed, but a canal by which it is conducted to the jaw, a bag under the tooth for keeping it ready for every occaſion, and alſo an aperture in the tooth itſelf for injecting it into the wound. To be more particular, the glands that ſerve to fabricate this venomous fluid are ſituated on each ſide of the head behind the eyes, and have their canals leading from thence to the bottom of the fangs in the upper jaw, where they empty into a kind of bladder, from whence the fangs on each ſide are ſeen to grow. The venom contained in this bladder is a yellowiſh thick taſteleſs liquor, which injected into the blood is death, yet which may be ſwallowed without any danger.

The fangs that give the wound come next under obſervation; they are large in proportion to the ſize of the animal that bears them; crooked, yet ſharp enough to inflict a ready wound. They grow one on each ſide, and ſometimes two, from two moveable bones in the the upper jaw, which by ſliding backward or forward, have a power of erecting or depreſſing the teeth at pleaſure. In theſe bones are alſo fixed many teeth, but no way venomous, and only ſerving to take and hold the animal's prey. Beſides this apt diſpoſion of the fangs, they are hollow within, and have an opening towards the point like the ſlit of a pen, through which when the fang is preſſed down upon the bladder where it grows, there is ſeen to iſſue a part of the venom that lay below. To deſcribe this operation at once, when the ſerpent is irritated to give a venomous wound, it opens its formidable jaws to the wideſt extent; the moveable bones of the upper jaw ſlide forward; the fangs that lay before inclining are thus erected; they are ſtruck with force into the fleſh of the obnoxious perſon; by meeting reſiſtance at the points, they preſs upon the bladders of venom from whence they grow; the venom iſſues up through the hollow of the tooth, and is preſſed out through its ſlit into the wound, which by this time the tooth has made in the ſkin. Thus from a ſlight puncture, and the infuſion of a drop of venom ſcarce larger than the head of a pin, the part is quickly inflamed and, without a proper antidote, the whole frame contaminated.

The appearances which this venom produces are different, according to the ſerpent that wounds, or the ſeaſon, or the ſtrength of the animal that ſtrikes the blow. If a viper inflicts the wound, and the remedy be neglected, the ſymptoms are not without danger. It firſt cauſes an acute pain in the place affected, attended with a ſwelling, firſt red, and afterwards livid. This by degrees ſpreads to the neighbouring parts; great faintneſs and a quick, though low and interrupted, pulſe enſues: to this ſucceed great ſickneſs at the ſtomach, billious and convulſive vomitings, cold ſweats, pains about the naval, and death itſelf. But the violence of the ſymptoms depend much on the ſeaſon of the year, the difference of the climate, the ſize or rage of the animal, and the depth and ſituation of the wound. Theſe ſymptoms are much more violent, and ſucceed each other more rapidly after the bite of a rattleſnake; but when the perſon is bit by the cobra di capello, he dies in an hour, his whole frame being diſſolved into a putrid maſs of corruption.

Nothing ſurely can more juſtly excite our wonder than that ſo ſmall a quantity of venom ſhould produce ſuch powerful and deadly effects. If the venom itſelf be examined through a microſcope, it will be found to ſhoot into little cryſtals, that, to an imagination already impreſſed with its potency, look like ſo many darts fit for entering the blood-veſſels, and wounding their tender coats. But all theſe darts are wholly of our own making, the ſofteſt mildeſt fluid whatever, poſſeſſed of any conſiſtency, will form cryſtals under the eye of the microſcope, and put on an appearance exactly like the venom of the viper. In fact, this venom has no acrid taſte whatever; and to all experiments that our ſenſes can make upon it, appears a ſlimy inſipid fluid. Charas, who often taſted it, aſſures us of the fact; and aſſerts, that it may be taken inwardly without any ſenſible effects or any prejudice to the conſtitution. But the famous experiments that were tried by Rhedi and others, in the preſence of the Great Duke of Tuſcany and his court, put this beyond any doubt whatſoever. By theſe it appeared, that the ſerpent having once bitten, exhauſted for that time the greateſt part of its poiſon; and though the wound cauſed by its biting a ſecond time was attended with ſome malignant ſymptoms, yet they were much milder than before. It appeared that the ſerpent biting upon a ſponge, or a piece of ſoft bread, and then biting a dog immediately after, did not inflict a wound more dangerous than the prickof a needle. It appeared that the venom being collected, and a needle dipped therein, this produced almoſt as painful effects as the tooth of the animal itſelf. But what cauſed the greateſt ſurpriſe in the court was the ſeeming raſhneſs of one Tozzi, a viper-catcher; who, while the philoſophers were giving elaborate lectures on the danger of the poiſon when taken internally, boldly deſired a large quantity of it might be put together; and then, with the utmoſt confidence, drank it off before them all. The court was ſtruck with aſtoniſhment, and expected that the man would inſtantly fall dead; but they ſoon perceived their miſtake, and found that taken in this manner the poiſon was as harmleſs as water; ſo true is that famous paſſage of Lucan,

Noxia ſerpentum eſt admixto ſanguine peſtis:
Morſu virus habent, et fatum in dente minantur:
Pocula morte carent.

What then ſhall we ſay to the ſpeed effect of ſo ſeemingly harmleſs a liquid taken into the circulation? Let us firſt obſerve, that milk is one of the moſt mild and nouriſhing of all fluids, and ſeemingly the moſt friendly to the human conſtitution; yet if milk be injected into a vein, it will quickly become fatal, and kill with more certain deſtruction than even the venom of the viper. From hence then we may infer, that the introducing not only the ſerpentine venom, but alſo a quantity of any other mixture, into the circulation, will be fatal; and that conſequently, ſerpents kill as well by their power of injecting the wound, as by the potency of their poiſon. Some indeed may inject a more acrimonious mixture, and this may produce more ſpeedy effects: but any mixture thus injected would be dangerous, and many would be fatal.

Ray gives us an inſtance of the potency of the ſerpent-poiſon; which, though it has all the air of a fable, I cannot help tranſcribing. "A gentleman who went over to the Eaſt Indies, while he was one day ſitting among ſome friends, was accoſted by an Indian juggler, who offered to ſhew him ſome experiments reſpecting the venom of ſerpents; an exhibition uſual enough in that country. Having firſt, therefore, produced a large ſerpent he aſſured the company that it was harmleſs; and to convince them of what he ſaid, he tied up his arm, as is uſual with thoſe who are going to be bled, and whipped the ſerpent till it was provoked to bite him. Having drawn in this manner about half a ſpoonful of blood from his arm, he put the congealed clot upon his thigh. He then took out a much ſmaller ſerpent, which was no other than the cobra di capello; and having tied up its neck, he procured about half a drop of its venom, which he ſprinkled on the clot of blood on his thigh, which inſtantly began to ferment and bubble, and ſoon changed colour from a red into a yellow."

This he pretended was cauſed by the extreme malignity of that animal's venom; however, I have no doubt that the whole is either a fable, or a trick of the Indian; who, while he ſeemed to mix the ſerpent's venom, actually infuſed ſome ſtronger ingredient, ſome mineral acid, into the maſs of blood, which was capable of working ſuch a change. It cannot be ſuppoſed that any animal poiſon could act ſo powerfully upon the blood already drawn and coagulated; for a poiſon that could operate thus inſtantaneouſly upon cold blood, could not fail of ſoon deſtroying the animal itſelf.

Be this as it will, the effects of ſerpent-poiſon are too well known, though the manner of operation be not ſo clear. As none of this malignant tribe grow to a great ſize, the longeſt of them not exceeding nine feet, they ſeldom ſeek the combat with larger animals, or offend others till they are firſt offended. Did they exert their malignity in proportion to their power, they could eaſily drive the ranks of Nature before them; but they ſeem unconſcious of their own ſuperiority, and rather fly than offer to meet the meaneſt oppoſer. Their food chiefly conſiſts of ſmall prey, ſuch as birds, moles, toads, and lizards; ſo that they never attack the more formidable animals that would ſeldom die unrevenged. They lurk therefore in the clefts of rocks, or among ſtony places; they twine round the branches of trees, or ſun themſelves in the long graſs at the bottom.—There they only ſeek repoſe and ſafety. If ſome unwary traveller invades their retreats, their firſt effort is to fly; but when either purſued or accidentally trod upon, they then make a fierce and fatal reſiſtance. For this purpoſe, they raiſe themſelves according to their ſtrength upon their tail, erect their head, ſeize the limb that preſſes them, the wound is given, and the head withdrawn in a moment. It is not therefore without reaſon, that the Aſiatics, who live in regions where ſerpents greatly abound, wear boots and long cloths, which very well protect their lower parts from the accidental reſentment of their reptile annoyers.

In the eaſtern and weſtern Indies, the number of noxious ſerpents is various; in this country we are acquainted only with one. The viper is the only animal in Great Britain from whoſe bite we have any thing to fear. In the tropical climates, the rattleſnake, the whipſnake, and the cobra di capello, are the moſt formidable, though by no means the moſt common. From the general notoriety of the particular ſerpents, and the univerſal terror which they occaſion, it would ſeem that few others are poſſeſſed of ſuch powerful malignity.

Vipers are found in many parts of this iſland; but the dry, ſtony, and particularly the chalky, countries abound with them. This animal ſeldom grows to a greater length than two feet; though ſometimes they are found above three. The ground colour of their bodies is a dirty yellow; that of the female is deeper. The back is marked the whole length with a ſeries of rhomboid black ſpots, touching each other at the points; the ſides with triangular ones, the belly entirely black. It is chiefly diſtinguiſhed from the common black ſnake by the colour, which in the latter is more beautifully mottled, as well as by the head, which is thicher than the body; but particularly by the tail, which in the viper, though it ends in a point, does not run tapering to ſo great a length as in the other. When, therefore, other diſtinctions fail, the difference of the tail can be diſcerned at a ſingle glance.

The viper differs from moſt other ſerpents in being much ſlower, as alſo in excluding its young completely formed, and bring them forth alive. The kindneſs of Providence ſeems exerted not only in diminiſhing the ſpeed, but alſo the fertility, of this dangerous creature. They copulate in May, and are ſuppoſed to be about three months before they bring forth, and have ſeldom above eleven eggs at a time. Theſe are of the ſize of a blackbird's eggs, and chained together in the womb like a ſtring of beads. Each egg contains from one to four young ones; ſo that the whole of a brood may amount to about twenty or thirty. They continue in the womb till they come to ſuch perfection as to be able to burſt from the ſhell; and they are ſaid by their own efforts to creep from the confinement into the open air, where they continue for ſeveral days without taking any food whatſoever. "We have been often aſſured," ſays Mr. Pennant, "by intelligent people, of the truth of a fact, that the young of the viper when terrified will run down the throat of the parent, and ſeek ſhelter in its belly in the ſame manner as the young of the oppoſſum retire into the ventral pouch of the old one. From this," continues he, "ſome have imagined that the viper is ſo unnatural as to devour its own young; but this deſerves no credit, as theſe animals live upon frogs, toads, lizards, and young birds, which they ſwallow whole, though the morſel is often three times as thick as their own body."

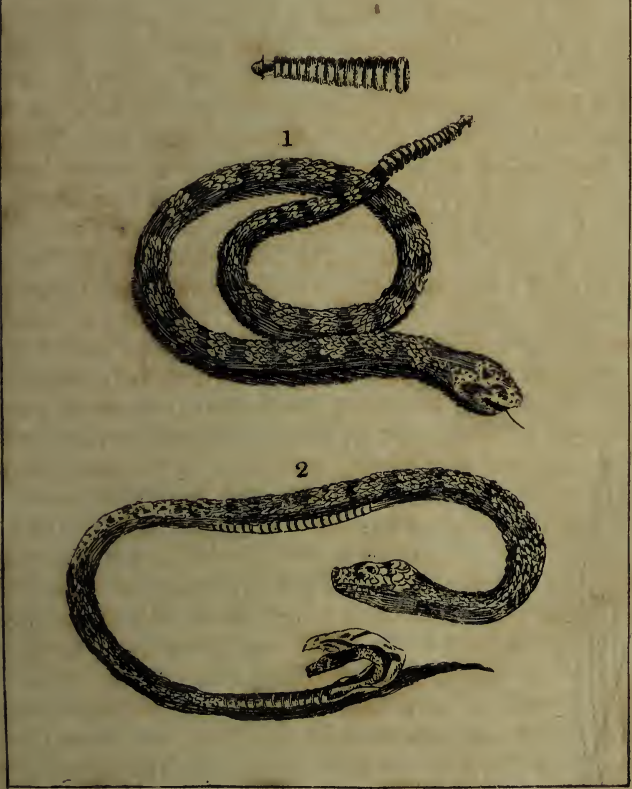
The viper is capable of ſupporting very long abſtinence, it being known that ſome have been kept in a box ſix months without food; yet during the whole time they did not abate of their vivacity. They feed only a ſmall part of the year, but never during their confinement; for if mice, their favourite diet, ſhould at that time be thrown into their box, though they will kill, yet they will never eat them. When at liberty, they remain torpid throughout the winter; yet, when confined, have never been obſerved to take their annual repoſe. Their poiſon, however, decreaſes in proportion to the length of their confinement; and it is thought, that the virtues of the animal's fleſh are, by the ſame reſtraints, conſiderably leſſened.

They are uſually taken with wooden tongs, by the end of the tail, which may be done without danger; for, while held in that poſition, they are unable to wind themſelves up to hurt their enemy: yet, notwithſtanding this precaution, the viper-catchers are frequently bit by them; but, by the application of olive-oil, the bite is effectually cured.

One William Oliver, a viper-catcher at Bath, was the firſt who diſcovered this admirable remedy. On the firſt of June, 1735, in the preſence of a great number of perſons, he ſuffered himſelf to be bit by an old black viper, brought by one of the company, upon the wriſt, and joint of the thumb of the right hand, ſo that drops of blood came out of the wounds: he immediately felt a violent pain both at the top of his thumb, and up his arm, even before the viper was looſened from his hand; ſoon after he felt a pain, reſembling that of burning trickle up his arm; in a few minutes his eyes began to look red and fiery, and to water much; in leſs than an hour he perceived the venom ſieze his heart, with a pricking pain, which was atttended with faintneſs, ſhortneſs of breath, and cold ſweats; in a few minutes after this, his belly began to ſwell, with great gripings, and pains in his back, which were attended with vomitings and purgings: during the violence of theſe ſymptoms, his ſight was gone for ſeveral minutes, but he could hear all the while. He ſaid, that in his former experiments he had never deferred making uſe of his remedy longer than he perceived the effects of the venom reaching his heart; but this time, being willing to ſatisfy the company thoroughly, and truſting to the ſpeedy effects of his remedy, which was nothing more than olive-oil, he forbore to apply any thing, till he found himſelf exceeding ill and quite giddy. About an hour and a quarter after the firſt of his being bit, a chaffing-diſh of glowing charcoal was brought in, and his naked arm was held over it, as near as he could bear, while his wife rubbed in the oil with her hand, turning his arm continually round, as if ſhe would have roaſted it over the coals: he ſaid the poiſon ſoon abated, but the ſwelling did not diminiſh much. Moſt violent purgings and vomitings ſoon enſued; and his pulſe became ſo low, and ſo often interrupted, that it was thought proper to order him a repetition of cordial potions: he ſaid he was not ſenſible of any great relief from theſe; but that a glaſs or two of olive-oil drank down, ſeemed to give him eaſe. Continuing in this dangerous condition, he was put to bed, where his arm was again bathed over a pan of charcoal, and rubbed with olive-oil, heated in a ladle over the charcoal, by Dr. Mortimer's direction, who was the phyſician that drew up the account. From this laſt operation he declared that he found immediate eaſe, as though by ſome charm: he ſoon after fell into a profound ſleep, and, after about nine hours ſound reſt, awaked about ſix the next morning, and found himſelf very well; but in the afternoon, on drinking ſome rum and ſtrong beer, ſo as to be almoſt intoxicated, the ſwelling returned, with much pain and cold ſweats, which abated ſoon, on bathing the arm, as before, and wrapping it up in a brown paper ſoaked in the oil.

Such are the effects of the viper's bite; yet its fleſh has long been celebrated as a noble medicine. A broth, made by boiling one viper in a quart of water till it comes to a pint, is the uſual method in which it is given at preſent; and it is ſaid to be a very powerful reſtorative in battered conſtitutions: the ſalt of vipers is alſo thought to exceed any other animal ſalt whatever, in giving vigour to the languid circulation, and prompting to venery.

The Rattle-ſnake is bred in America, and in no part of the old world. Some are as thick as a man's leg, and ſix feet in length; but the moſt uſual ſize is from four to five feet long. In moſt particulars it reſembles the viper: like that animal, having a large head and a ſmall neck, being of a duſky colour, and furniſhed with fangs that inflict the moſt terrible wounds. It differs, however, in having a large ſcale, which hangs like a penthouſe over each eye. The eye alſo is furniſhed with a nictitating membrane, that preſerves it from duſt; and its ſcales are of a conſiderable degree of hardneſs. They are of an orange, tawny, and blackiſh colour on the back; and of an aſh-colour on the belly, inclining to lead. The male may be readily diſtinguiſhed from the female, by a black velvet ſpot on the head, and by the head being ſmaller and longer. But that which, beſides their ſuperior malignity, diſtinguiſhes them from all other animals, is their rattle, an inſtrument lodged in their tail, by which they make ſuch a loud, rattling noiſe, when they move, that their approach may readily be perceived, and the danger avoided. This rattle, which is placed in the tail, ſomewhat reſembles, when taken out of the body, the curb chain of a bridle: it is compoſed of ſeveral thin, hard, hollow bones, linked to each other, and rattling upon the ſlighteſt motion. It is ſuppoſed by ſome, that the ſnake acquires an additional bone every year; and that, from hence, its age may be preciſely known: however this may be, certain it is, that the young ſnakes, of a year or two old, have no rattles at all; while many old ones have been killed, that had from eleven to thirteen joints each. They ſhake and make a noiſe with theſe rattles with prodigious quickneſs when they are diſturbed; however, the peccary and the



1 The Rattle Snake
2 The Female Viper

vulture are no way terrified at the ſound, but haſten, at the ſignal, to ſeize the ſnake, as their moſt favourite prey.

It is very different with almoſt every other animal. The certain death which enſues from this terrible creature's bite, makes a ſolitude wherever it is heard. It moves along with the moſt majeſtic rapidity; neither ſeeking to offend the larger animals, nor fearing their inſults. If unprovoked, it never meddles with any thing but its natural prey; but when accidentally trod upon, or purſued to be deſtroyed, it then makes a dreadful and deſperate defence. It erects itſelf upon its tail, throws back the head, and inflicts its wound in a moment; then parts, and inflicts a ſecond wound: after which, we are told, by ſome, that it remains torpid and inactive, without even attempting to eſcape.

The very inſtant the wound is inflicted, though ſmall in itſelf, it appears more painful than the ſting of a bee. This pain, which is ſo ſuddenly felt, far from abating, grows every moment more excruciating and dangerous: the limb ſwells; the venom reaches the head, which is ſoon of a monſtrous ſize; the eyes are red and fiery; the heart beats quick, with frequent interruptions: the pain becomes inſupportable, and ſome expire under it in five or ſix hours; but others, who are of ſtronger conſtitutions, ſurvive the agony for a few hours longer, only to ſink under a general mortification, which enſues, and corrupts the whole body.

As a gentleman in Virginia was walking the field for his amuſement, he accidentally trod upon a rattleſnake, that had been lurking in a ſtony place; which, enraged by the preſſure, reared up, bit his hand, and ſhook his rattles. The gentleman readily perceived that he was in the moſt dreadful danger; but unwilling to die unrevenged, he killed the ſnake, and carrying it home in his hand, threw it on the ground before his family, crying out, "I am killed, and there is my murderer!" In ſuch an extremity, the ſpeedieſt remedies were the beſt. His arm, which was beginning to ſwell, was tied up near the ſhoulder, the wound was anointed with oil, and every precaution taken to ſtop the infection. By the help of a very ſtrong conſtitution he recovered; but not without feeling the moſt various and dreadful ſymptoms for ſeveral weeks together. His arm, below the ligature, appeared of ſeveral colours, with a writhing among the muſcles, that, to his terrified imagination appeared like the motions of the animal that had wounded him. A fever enſued; the loſs of his hair, giddineſs, drought, weakneſs, and nervous faintings: till, by ſlow degrees, a very ſtrong habit overpowered the latent malignity of the poiſon.

Several remedies have been tried to alleviate this calamity. A decoction of the Virginian ſnake-root is conſidered as the moſt effectual; and at the ſame time the head of the animal bruiſed and laid upon the part affected, is thought to aſſiſt the cure. In general, however, it is found to be fatal; and the Indians, ſenſible of this, take care to dip their arrows in the poiſon under the rattleſnake's fangs, when they deſire to take a ſignal revenge of their enemies.

Thus much concerning this animal is agreed upon by every naturaliſt: there are other circumſtances in its hiſtory, which are not ſo well aſcertained. And firſt, its motion, which ſome deſcribe as the ſwifteſt imaginable; aſſerting, that its Indian name of *Ecacoalt*, which ſignifies the wind-ſerpent, implies its agility: others, on the contrary, aſſert, that it is the ſloweſt and the moſt ſluggiſh of all ſerpents; and that it ſeldom moves from one place. In this oppoſition of opinions, there are others, who aſſert, that on even ground it moves but ſlowly; but then, among rocks, that it goes at a great rate. If we may argue from analogy, the opinion of thoſe who contend for its ſlow motion, ſeems the moſt probable; as the viper, which it ſo very much reſembles, is remarkable among ſerpents for its inactivity.

It is ſaid alſo by ſome, that the rattleſnake has a power of charming its prey into its mouth; and this is as ſtrongly contradicted by others. The inhabitants of Penſylvania are ſaid to have opportunities of obſerving this ſtrange faſcination every day. The ſnake is often ſeen baſking at the foot of a tree, where birds and ſquirrels make their reſidence. There, coiled upon its tail, its jaws extended, and its eyes ſhining like fire, the rattleſnake levels its dreadful glare upon one of the little animals above. The bird or the ſquirrel, which ever it may be, too plainly perceives the miſchief meditating againſt it, and hops from branch to branch, with a timorous, plaintive ſound, wiſhing to avoid, yet incapable of breaking through the faſcination: thus it continues for ſome time its feeble efforts and complaints, but is ſtill ſeen approaching lower and lower towards the bottom branches of the tree, until, at laſt, (as if overcome by the potency of its fears, it jumps down from the tree directly into the throat of its frightful deſtroyer.

In order to aſcertain the truth of this ſtory, a mouſe was put into a large iron cage, where a rattleſnake was kept, and the effect carefully obſerved. The mouſe remained motionleſs at one end of the cage; while the ſnake, at the other, continued fixed, with its eye glaring full on the little animal, and its jaws opened to their wideſt extent: the mouſe for ſome time ſeemed eager to eſcape; but every effort only ſerved to increaſe its terrors, and to draw it ſtill nearer the enemy; till, after ſeveral ineffectual attempts to break the faſcination, it was ſeen to run into the jaws of the rattleſnake, where it was inſtantly killed.

To theſe accounts the incredulous oppoſe the improbability of the fact; they aſſert, that ſuch a power aſcribed to ſerpents, is only the remnant of a vulgar error, by which it was ſuppoſed that ſerpents could be charmed, and had alſo a power of charming. They aver, that animals are ſo far from running down the throat of a rattleſnake in captivity, that the ſnake will eat nothing in that ſtate, but actually dies for want of ſubſiſtence.

A ſerpent, called the Whipſnake, is ſtill more venomous than the former. This animal which is a native of the eaſt, is about five feet long, yet not much thicker than the thong of a coachman's whip. It is exceedingly venomous; and its bite is ſaid to kill in about ſix hours. One of the Jeſuit miſſionaries, happening to enter into an Indian pagoda, ſaw what he took to be a whipcord lying on the floor, and ſtooped to take it up; but, upon handling it, what was his ſurpriſe to find that it was animated, and no other than the whipſnake, of which he had heard ſuch formidable accounts: fortune, however, ſeemed favourable to him, for he graſped it by the head, ſo that it had no power to bite him, and only twiſted its folds up his arm. In this manner he held it, till it was killed by thoſe who came to his aſſiſtance.

To this formidable claſs might be added the Aſp, whoſe bite however is not attended with thoſe drowſy ſymptoms which the ancients aſcribed to it. The Jaculus of Jamaica alſo, is one of the ſwifteſt of the ſerpent kind. The Hæmorrhois, ſo called from the *hæmorrhages* which its bite is ſaid to produce; the Seps whoſe wound is very venomous, and cauſes the part affected to corrupt in a very ſhort time; the Coral Serpent, which is red, and whoſe bite is ſaid to be fatal. But of all others, the Cobra di Capello, or Hooded Serpent, inflicts the moſt deadly and incurable wounds. Of this formidable creature there are five or ſix different kinds; but they are all equally dangerous, and their bite followed by ſpeedy and certain death. It is from three to eight feet long, with two large fangs hanging out of the upper jaw. It has a broad neck, and a mark of dark brown on the forehead; which, when viewed frontwiſe, looks like a pair of ſpectacles; but behind like the head of a cat. The eyes are fierce and full of fire; the head is ſmall, and the noſe flat, though covered with very large ſcales, of a yellowiſh-aſh colour; the ſkin is white, and the large tumour on the neck is flat, and covered with oblong, ſmooth ſcales. The bite of this animal is ſaid to be incurable, the patient dying in about an hour after the wound; the whole frame being diſſolved into one putrid maſs of corruption.

To remedy the bite of all theſe animals, perhaps ſalad-oil would be very efficacious: however, the Indians make uſe of a compoſition, which is called, in Europe, *Petro de Cobra*, or the *Serpent-ſtone;* and which applied to the wound, is ſaid to draw out the venom. The compoſition of this ſtone, for it is an artificial ſubſtance, is kept a ſecret; and perhaps its effects in extracting the venom may be imaginary: nevertheleſs, it is certain that it has a power of ſticking to the ſkin, and ſucking a part of the blood from the wound. This it may do ſomewhat in the ſame manner as we ſee a tobacco-pipe ſtick to the lips of a man who is ſmoking: yet ſtill we are ignorant of the manner; and the ſecret might probably be of ſome uſe in medicine. It were to be wiſhed therefore, that thoſe who go into India would examine into this compoſition, and give us the reſult of their inquiries: but I fear that it is not to benefit mankind, that our travellers now go to India.

CHAP. III.

OF SERPENTS WITHOUT VENOM.

THE claſs of ſerpents without poiſon, may be diſtinguiſhed from thoſe that are venomous, by their wanting the fang-teeth: their heads, alſo, are not ſo thick in proportion to their bodies; and, in general, they taper off to the tail more gradually in a point. But notwithſtanding their being deſtitute of venom, they do not ceaſe to be formidable: ſome grow to a ſize by which they become the moſt powerful animals of the foreſt; and even the ſmalleſt and moſt harmleſs of this ſlender tribe, find protection from the ſimilitude of their form.

The fangs make the great diſtinction among ſerpents; and all this tribe are without them. Their teeth are ſhort, numerous, and, in the ſmaller kinds, perfectly inoffenſive: they lie in either jaw, as in frogs and fiſhes, their points bending backwards, the better to ſecure their prey. They want that artificial mechaniſm by which the poiſonous tribe inflict ſuch deadly wounds: they have no gland in the head for preparing venom; no conduits for conveying it to the teeth; no receptacles there; no hollow in the inſtrument that inflicts the wound. Their bite, when the teeth happen to be large enough to penetrate the ſkin, (for, in general, they are too ſmall for this purpoſe) is attended with no other ſymptoms than thoſe of an ordinary puncture; and many of this tribe, as if ſenſible of their own impotence, cannot be provoked to bite, though never ſo rudely aſſaulted.— They hiſs, dart out their forky tongues, erect themſelves on the tail, and call up all their terrors to intimidate their aggreſſors; but ſeem to conſider their teeth as unneceſſary inſtruments of defence, and never attempt to uſe them. Even among the largeſt of this kind, the teeth are never employed, in the moſt deſperate engagements. When a hare or a bird is caught, the teeth may ſerve to prevent ſuch ſmall game from eſcaping; but when a buffalo or a tiger is to be encountered, it is by the ſtrong folds of the body, by the fierce verberations of the tail, that the enemy is deſtroyed:

by this twining round, and drawing the knot with convulſive energy, this enormous reptile breaks every bone in the quadruped's body, and then, at one morſel, devours its prey.

From hence we may diſtinguiſh the unvenomous tribe into two kinds: firſt, into thoſe which are ſeldom found of any conſiderable magnitude, and that never offend animals larger or more powerful than themſelves, but which find their chief protection in flight, or in the doubtfulneſs of their form; ſecondly, into ſuch as grow to an enormous ſize, fear no enemy, but indiſcriminately attack all other animals and devour them. Of the firſt kind is the Common Black Snake, the Blind Worm, the Eſculapian Serpent, the Amphiſbæna, and ſeveral others. Of the ſecond, the Liboya, the Boiguacu, the Depona, and the Boiquatrara.

The Black Snake is the largeſt of Engliſh ſerpents, ſometimes exceeding four feet in length. The neck is ſlender; the middle of the body thick; the back and ſides covered with ſmall ſcales; the belly with oblong, narrow, tranſverſe plates: the colour of the back and ſides are of a duſky brown; the middle of the back marked with two rows of ſmall black ſpots, running from the head to the tail; the plates on the belly are duſky; the ſcales on the ſides are of a bluiſh white; the teeth are ſmall and ſerrated, lying on each ſide of the jaw in two rows. The whole ſpecies is perfectly inoffenſive; taking ſhelter in dunghills, and among buſhes in moiſt places; from whence they ſeldom remove, unleſs in the midſt of the day, in ſummer, when they are called out by the heat to baſk themſelves in the ſun. If diſturbed or attacked, they move away among the brambles with great ſwiftneſs; but if too cloſely purſued, they hiſs and threaten, and thus render themſelves formidable, though incapable of offending.

The black ſnake preys upon frogs, inſects, worms, mice, and young birds; and, conſidering the ſmallneſs of the neck, it is amazing how large an animal it will ſwallow.—The black ſnake of Virginia, which is larger than ours, and generally grows to ſix feet long, takes a prey proportionable to its ſize; partridges, chickens, and young ducks. It is generally found in the neighbourhood of the hen-rooſt, and will devour the eggs even while the hen is ſitting upon them: theſe it ſwallows whole, and often after it has done the miſchief, will coil itſelf round in the neſt.

The whole of this tribe are oviparous, excluding eighty or a hundred eggs at a time, which are laid in dunghills or hot-beds; the heat of which, aided by that of the ſun, brings them to maturity. During winter they lie torpid, in banks of hedges, and under old trees.

The Blind Worm is another harmleſs reptile, with a formidable appearance. The uſual length of this ſpecies is eleven inches. The eyes are red; the head ſmall; the neck ſtill more ſlender; from that part the body grows ſuddenly, and continues of an equal bulk to the tail, which ends quite blunt: the colour of the back is cinereous, marked with very ſmall lines, compoſed of minute black ſpecks; the ſides are of a reddiſh caſt; the belly duſky, and marked like the back. The motion of this ſerpent is ſlow; from which, and from the ſmallneſs of the eyes, are derived its names; ſome calling it the ſlow and ſome the blind worm. Like all the reſt of the kind in our climates, they lie torpid during winter; and are ſometimes found in vaſt numbers, twiſted together. This animal, like the former, is perfectly innocent; however, like the viper it brings forth its young alive. Geſner tells us, that one of theſe being ſtruck on the head when it was pregnant, it immediately caſt forth its young.

The Amphiſbæna, or the Double Headed Serpent, is remarkable for moving along with either the head or the tail foremoſt; and from thence it has been thought to have two heads. This error took its riſe from the thickneſs of the tail, which, at a diſtance, may be miſtaken for another head. Upon a nearer view, however, the error is eaſily diſcovered, and the animal will be found formed according to the uſual courſe of Nature. It is as thick at one end as at the other; and the colour of the ſkin is like that of the earth, being rough, hard, and variouſly ſpotted. Some have affirmed that its bite is dangerous; but this muſt be a miſtake, as it wants the fangs, and, conſequently, the elabaratory that prepares the poiſon.

Theſe animals are only formidable from their ſimilitude to the viper tribe; and, in ſome countries, where ſuch reptiles are common, they make the diſtinction ſo exactly, that while they deſtroy ſerpents of one kind with great animoſity, they take others into their houſes, and even into their boſoms, with a kind of unaccountable affection. The Eſculapian

Serpent of Italy is among this number. It is there ſuffered to crawl about the chambers; and often gets into the beds where people lie. It is a yellow ſerpent, of about an ell long; and, though innocent, yet will bite when exaſperated. They are ſaid to be great deſtroyers of mice; and this may be the reaſon why they are taken under human protection. The Boyuna of Ceylon is equally a favourite among the natives; and they conſider the meeting it as a ſign of good luck. The Surinam Serpent, which ſome improperly call the Ammodytes, is equally harmleſs and deſirable among the ſavages of that part of the world. They conſider themſelves as extremely happy if this animal comes into their huts. The colours of this ſerpent are ſo many and beautiful, that they ſurpaſs all deſcription; and theſe, perhaps, are the chief inducements to the ſavages to conſider its viſits as ſo very fortunate. A ſtill greater favourite is the Prince of Serpents, a native of Japan, that has not its equal for beauty. The ſcales which cover the back are reddiſh, finely ſhaded, and marbled with large ſpots of irregular figures mixed with black. The fore part of the head is covered with large beautiful ſcales, the jaws bordered with yellow, the forehead marked with a black marbled ſtreak, and the eyes handſome and lively. But of all others, the Gerenda of the Eaſt Indies is the moſt honoured and eſteemed. To this animal, which is finely ſpotted with various colours, the natives of Calicut pay divine honours; and while their deity lies coiled up, which is its uſual poſture, the people fall upon their faces before it with ſtupid adoration. The African Gerenda is larger and worſhipped in the ſame manner by the inhabitants of the coaſts of Mozambique. The ſkin is not ſo finely ſpotted as the former; but it is variegated all over the body with very fine, white, aſh-coloured, and black ſpots. The brilliancy of colouring in theſe reptiles would only ſerve with us to increaſe our diſguſt; but in thoſe countries where they are, common diſtinctions are made; and even in this horrid claſs, there are ſome eyes that can diſcover beauty.

But in the larger tribe of ſerpents, there is nothing but danger to be apprehended. This formidable claſs, though without venom, have ſomething frightful in their colour, as well as their ſize and form. They want that vivid hue with which the ſavages are ſo much pleaſed in the leſſer kinds;

they are all found of a duſky colour, with large teeth, which are more formidable than dangerous.

The firſt of this claſs is the Great Jiboya of Java and Braſil, which Legaut affirms, he has ſeen fifty feet long. Nor is he ſingular in this report, as many of the miſſionaries affirm the ſame; and we have the concurrent teſtimony of hiſtorians as a further proof. The largeſt animal of this kind which has been brought into Europe, is but thirty-ſix feet long; and it is probable, that much greater have been ſeen and deſtroyed, before they were thought worth ſending ſo far to ſatisfy European curioſity. The moſt uſual length, however, of the jiboya, is about twenty feet, and the thickneſs in proportion. The teeth are ſmall in proportion to the body; nor are they uſed, but when it ſeizes the ſmalleſt prey. It lies in wait for wild animals near the paths, and when it throws itſelf upon them, it wraps them round ſo cloſely as to break all the bones; then moiſtening the whole body over with its ſlaver, it makes it fit for deglutition, and ſwallows it whole.

The Boiguacu is ſuppoſed to be the next in magnitude, and has often been ſeen to ſwallow a goat whole. It is thickeſt in the middle of the body, and grows ſhorter and ſmaller towards the head and the tail; on the middle of the back, there is a chain of ſmall black ſpots running along the length of it; and on each ſide, there are large, round, black ſpots, at ſome diſtance from each other, which are white in the centre: between theſe, near the belly, there are two rows of leſſer black ſpots, which run parallel to the back. It has a double row of ſharp teeth in each jaw, of a white colour, and ſhining like mother-of-pearl. The head is broad; and over the eyes it is raiſed into two prominences: near the extremity of the tail there are two claws, reſembling thoſe of birds.

Theſe ſerpents lie hid in thickets, from whence they ſally out unawares, and raiſing themſelves upright on their tails, will attack both men and beaſts. They make a loud, hiſſing noiſe when exaſperated; and ſometimes winding up trees, will dart down upon travellers, and twiſt themſelves ſo cloſely round their bodies, as to deſpatch them in a very few minutes. Condamine, however, affirms, that their bite is not dangerous; for though the teeth are ſo large as to inſpire the beholder with terror, yet the wound they make is attended with no dangerous conſequences whatever. Dellon affirms, that they generally haunt deſert places; and though they are ſometimes ſeen near great towns, or on the banks of rivers, yet it is generally after ſome great inundation: he never ſaw any but what were dead; and they appeared to him like the trunk of a great tree lying on the ground.

To this claſs of large ſerpents, we may refer the Depona, a native of Mexico, with a very large head and great jaws. The mouth is armed with cutting, crooked teeth, among which there are two longer then the reſt, placed in the fore part of the upper jaw, but very different from the fangs of the viper. All round the mouth there is a broad ſcaly border; and the eyes are ſo large, that they give it a very terrible aſpect. The forehead is covered with very large ſcales; on which are placed others, that are ſmaller, curiouſly ranged: thoſe on the back are greyiſh, and along it runs a double chain, whoſe ends are joined in the manner of a buckler. Each ſide of the belly is marbled with large ſquare ſpots, of a cheſnut colour, in the middle of which is a ſpot, which is round and yellow. They avoid the ſight of man; and, conſequently, never do much harm.

Such are the the moſt noted animals of the ſerpent tribe; but to recount all, would be a vain, as well an uſeleſs endeavour. In thoſe countries where they abound, their diſcriminations are ſo numerous, and their colours ſo various, that every thicket ſeems to produce a new animal. The ſame ſerpent is often found to bring forth animals of eight or ten different colours: and the naturaliſt who attempts to arrange them by that mark, will find that he has made diſtinctions which are entirely diſowned by Nature: however, a very conſiderable number might be added to enlarge the catalogue; but having ſupplied a general hiſtory, the mind turns away from a ſubject where every object preſents ſomething formidable or loathſome to the imagination. Indeed, the whole tribe reſemble each other ſo nearly, that the hiſtory of one may almoſt ſerve for every other. They are all terrible to the imagination, all frightful to behold in their fury, and have long been conſidered as a race of animals between whom and man there is a natural antipathy.

PART VI.

OF INSECTS.

BOOK I.

INSECTS OF THE FIRST ORDER.

CHAP. I.

OF INSECTS IN GENERAL.

HAVING gone through the upper ranks of Nature, we deſcend to that of inſects, a ſubject almoſt inexhauſtible from the number of its tribes and the variety of their appearance. Thoſe who have profeſſedly written on this ſubject ſeem to conſider it as one of the greateſt that can occupy the human mind, as the moſt pleaſing in Animated Nature.—"After an attentive examination," ſays Swammerdam, "of the nature and anatomy of the ſmalleſt as well as the largeſt animals, I cannot help allowing the leaſt an equal, or perhaps a ſuperior, degree of dignity. If, while we diſſect with care the larger animals, we are filled with wonder at the elegant diſpoſition of their parts, to what a height is our aſtoniſhment raiſed, when we diſcover all theſe parts arranged in the leaſt in the ſame regular manner! Notwithſtanding the ſmallneſs of ants, nothing hinders our preferring them to the largeſt animals. If we conſider either their unwearied diligence, their wonderful ſtrength, or their inimitable propenſity to labour. Their amazing love to their young is ſtill more unparalleled among the larger claſſes. They not only daily carry them to ſuch places as may afford them food; but if, by accident, they are killed, and even cut into pieces, they, with the utmoſt tenderneſs, will carry them away piecemeal in their arms. Who can ſhow ſuch an example among the larger animals, which are dignified with the title of perfect? Who can find an inſtance in any other creature that can come in competition with this?"

Such is the language of a man, who, by long ſtudy, became enamoured of his ſubject; but to thoſe who judge leſs partially, it will be found that the inſect tribe, for every reaſon, deſerve but the laſt and loweſt rank in Animated Nature. As in mechanics the moſt complicated machines are required to perform the niceſt operations, ſo in anatomy the nobleſt animals are moſt variouſly and wonderfully made.—Of all living beings, man offers the moſt wonderful variety in his internal conformation; quadrupeds come next, and other animals follow in proportion to their powers or their excellencies. Inſects ſeem of all others the moſt imperfectly formed: from their minuteneſs, the diſſecting knife can go but a ſhort way in the inveſtigation; but one thing argues an evident imperfection, which is, that many of them can live a long time, though deprived of thoſe organs which are neceſſary to life in the higher ranks of Nature. Many of them are furniſhed with lungs and a heart, like nobler animals; yet the caterpillar continues to live, though its heart and lungs, which is often the caſe, are entirely eaten away.

But it is not from their conformation alone that inſects are inferior to other animals, but from their inſtincts alſo. It is true that the ant and the bee preſent us with very ſtriking inſtances of aſſiduity; but how far are theirs beneath the marks of ſagacity exhibited in the hound or the ſtag! a bee, taken from the ſwarm, is totally helpleſs and inactive, incapable of giving the ſmalleſt variation to its inſtincts: it has but one ſingle method of operating, and, if put from that, it can turn to no other. In the purſuits of the hound, there is ſomething like a choice; in the labours of the bee, the whole appears like neceſſity or compulſion.

If inſects be conſidered as bearing a relation to man, and as aſſiſting him in the pleaſures or neceſſities of life, they will, even in this reſpect, ſink in the compariſon with the larger tribes of Nature. It is true that the bee, the ſilkworm, the cochineal fly, and the cantharides, render him ſignal ſervices; but how many others of this claſs, are either noxious or totally unſerviceable to him. Even in a country like ours, where all the noxious animals have been reduced by repeated aſſiduity, the inſect tribes ſtill maintain their ground, and are but too often unwelcome intruders upon the fruits of human induſtry. But in more uncultivated regions, their annoyance and devaſtations are terrible. What an uncomfortable life muſt the natives lead in Lapland, and ſome parts of America, where if a candle be lighted, the inſects ſwarm in ſuch abundance, as inſtantly to extinguiſh it with their numbers; where the inhabitants are obliged to ſmear their bodies and faces with tar, or ſome other compoſition, to protect them from the puncture of their minute enemies; where, though millions are deſtroyed, famiſhed millions are ſtill ſeen to ſucceed, and to make the torture endleſs!

" Their amazing number is alſo an argument of their imperfection. It is a rule that obtains through all Nature, that the nobler animals are ſlowly produced, and that Nature acts with a kind of dignified economy; but the meaner births are laviſhed in profuſion, and thouſands are brought forth merely to ſupply the neceſſities of the more favourite objects of Creation. Of all other productions in Nature, inſects are the moſt numerous. Vegetables that cover the ſurface of the earth bear no proportion to their multitudes; and though, at firſt ſight, herbs of the field ſeem to be the parts of organized Nature produced in the greateſt abundance, yet upon minuter inſpection, we ſhall find every plant ſupporting a number of ſcarce perceptible creatures, that fill up the various ſtages of youth, vigour, and age, in the compaſs of a few days exiſtence.

All other animals are capable of ſome degree of education; their inſtincts may be ſuppreſſed or altered; the dog may be taught to fetch and carry; the bird to whiſtle a tune; and the ſerpent to dance; but the inſect has but one invariable method of operating; no arts can turn it from its inſtincts; and, indeed, its life is too ſhort for inſtruction, as a ſingle ſeaſon often terminates its exiſtence.

For theſe reaſons, the inſect tribe are deſervedly placed in the loweſt rank of Animated Nature; and, in general, they ſeem more allied to the vegetables on which they feed, than to the nobler claſſes above them. Many of them are attached to one vegetable, often to a ſingle leaf; there they increaſe with the flouriſhing plant, and die as it decays; a few days fill up the meaſure of their contemptible lives; while the ends for which they were produced, or the pleaſures they enjoyed, to us at leaſt, are uttertly unknown.

Yet while I am thus fixing the rank of a certain claſs of animals, it ſeems neceſſary to define the nature of thoſe animals which are thus degraded. Definitions in general produce little knowledge; but here where the ſhades of Nature are ſo intimately blended, ſome diſcrimination is neceſſary to prevent confuſion. The ſmallneſs of the animal, for inſtance, does not conſtitute an inſect; for then, many of the lizard kind, which are not above two inches long, would come under this denomination, and if the ſmaller lizards, why not the crocodile? which would be a terrible inſect indeed! In the ſame manner, ſmallneſs, with a ſlow creeping motion, does not conſtitute an inſect; for, though ſnails might be called inſects with the ſame propriety, the whole tribe of ſea ſhell-fiſh would then have equal pretenſions, and a very troubleſome innovation would be brought into our language, which is already formed. Excluding ſuch animals, therefore, from the inſect tribe, we may define inſects to be *little animals without red blood, bones, or cartilages, furniſhed with a trunk, or elſe a mouth, opening lengthwiſe, with eyes which they are incapable of covering, and with lungs which have their openings on the ſides.* This definition comprehends the whole claſs of inſects, whether with or without wings, whether in their caterpillar or butterfly ſtate, whether produced in the ordinary method of generation between male and female, or from an animal that is itſelf both male and female, or from the ſame animal cut into ſeveral parts, and each part producing a perfect animal.

From hence it appears, that in this claſs of animals there are numerous diſtinctions, and that a general deſcription will by no means ſerve for all. Almoſt every ſpecies has its own diſtinct hiſtory; and exhibits manners, appetites, and modes of propagation, peculiarly its own. In the larger ranks of exiſtence, two animals that nearly reſemble each other in form will be found to have a ſimilar hiſtory; but here inſects almoſt entirely alike will be often found perfectly diſſimilar, as well in their manner of bringing forth and ſubſiſting, as in the changes which they undergo during their ſhort lives. Thus as this claſs is prolific beyond computation, ſo are its varieties multiplied beyond the power of deſcription. The attempt to enumerate all the ſpecies of a fly or a moth would be very fruitleſs; but to give a hiſtory of all would be utterly impracticable: So various are the appetities, the manners, and the lives of this humble claſs of beings, that every ſpecies requires its diſtinct hiſtory. An exact plan, therefore, of Nature's operations in this minute ſet of creatures is not to be expected; and yet ſuch a general picture may be given, as is ſufficient to ſhew the protection which Providence affords its ſmalleſt as well as its largeſt productions, and to diſplay that admirable circulation in Nature by which one ſet of living beings find ſubſiſtence from the deſtruction of another; and by which life is continued without a pauſe in every part of the Creation.

Upon caſting a ſlight view over the whole inſect tribe juſt when they are ſuppoſed to rouze from their ſtate of annual torpidity, when they begin to feel the genial influence of ſpring, and again exhibit new life in every part of Nature, their numbers and their varieties ſeem to exceed all powers of calculation, and they are indeed too great for deſcription. When we look cloſer, however, we ſhall find ſome ſtriking ſimilitudes, either in their propagation, their manners, or their form, that give us a hint for grouping ſeveral of them into one deſcription, and thus enabling us to ſhorten the labour of a ſeparate hiſtory for every ſpecies. Swammerdam, Reaumur, and Linnæus, have each attempted to abridge the taſk of deſcription, by throwing a number of ſimilar animals into diſtinct claſſes, and thus making one general hiſtory ſtand for all. I will avail myſelf of their labours; and uniting their general diſtinctions, throw the whole claſs of inſects into four ſeparate diſtributions, giving under each the hiſtory of every ſpecies that ſeems to me conſiderable enough to deſerve our notice. Thus our labour will be ſhortened; and the very rank in which an inſect is placed will, in ſome meaſure, exhibit a conſiderable part of its hiſtory.

In our curſory inſpection of the inſect tribe, the firſt animals that offer themſelves are thoſe which want wings, that appear crawling about on every plant, and on every ſpot of earth we regard with any degree of attention. Of theſe, ſome never obtain wings at any period of their exiſtence, but are deſtined to creep on the vegetable, or the ſpot of earth where they are ſtationed for their whole lives. On the contrary, others are only candidates for a more happy ſituation; and only wait their growing wings, when they may be ſaid to arrive at their ſtate of full perfection.

Thoſe that never have wings, but creep about till they die, may be conſidered as conſtituting the FIRST CLASS of inſects. All theſe, the flea and the wood-louſe only excepted, are produced from an egg; and when once they break the ſhell, they never ſuffer any further change of form, but continue to grow larger till they die. Thus the louſe or the ſpider are produced from an egg, never ſuffering any alteration when once they are excluded; but, like the chicken or the duck, remaining invariably the ſame, from their birth to their diſſolution.

The SECOND ORDER of inſects conſiſts of ſuch as have wings; but which, when produced from the egg, have thoſe wings caſed up in ſuch a manner as not to appear. This caſing up of the wing, however, does not prevent the animal's running, leaping, and moving with its natural celerity; but when the caſe burſts, and the wings have a power of expanding, all the animal's motions become more extenſive, and the animal arrives at full perfection. Thus the graſshopper, the dragon fly, and the ear-wig, have their wings at firſt bound down; but when the ſkin that, like a pair of ſtays, kept them confined, burſts, they are then expanded, and the animal purſues the purpoſes for which it was produced.

The THIRD ORDER of inſects is of the moth and butterfly kind. Theſe all have four wings, each covered with a mealy ſubſtance of various colours, which when handled comes off upon the fingers; and, if examined by the microſcope, will appear like ſcales, with which the wing is nicely embroidered all over. Theſe inſects alſo are produced in a manner peculiar to themſelves. They are firſt hatched from an egg, from whence proceeds a caterpillar that eats, and often caſts its ſkin; the caterpillar having diveſted itſelf for the laſt time, aſſumes a new covering, which is called a chryſalis, or the cone in the ſilk-worm, in which it continues hidden till it comes forth a perfect moth, or butterfly.

The FOURTH ORDER is of thoſe winged inſects which come from a worm inſtead of a caterpillar, and yet go through changes ſimilar to thoſe which moths and butterflies are ſeen to undergo. They are firſt excluded from the egg as a worm, and then become a chryſalis; in ſome, their wings and legs are ſeen; in others, the animal is quite detached from the cone in which it is concealed; but all at length break their priſon, and come out perfect winged animals; ſome furniſhed with two wings and ſome with four. The wings of all theſe differ from thoſe of the butterfly and moth kind, by not having the mealy ſcales which are ever found on the wings of the former. In this claſs we may place the numerous tribes of gnats, beetles, bees, and flies.

To theſe I will add, as a FIFTH ORDER, a numerous tribe lately diſcovered, to which naturaliſts have given the name of Zoophytes. Theſe do not go through the ordinary forms of generation, but may be propagated by diſſection. Some of theſe, though cut into a hundred parts, ſtill retain life in each, and are endued with ſuch a vivacious principle, that every part will in a ſhort time become a perfect animal.—They ſeem a ſet of creatures placed between animals and vegetables, and make the ſhade that connects Animated and Inſenſible Nature. To this claſs belong the polypus, the earth-worm, and all the varieties of the ſea-nettle.

Having thus given a general diſtribution of inſects, I will proceed to deſcribe each claſs in the order I have mentioned them; beginning with inſects without wings, as they more nearly reſemble the higher ranks of Nature, as well in their habits as their conformation.

CHAP. II.

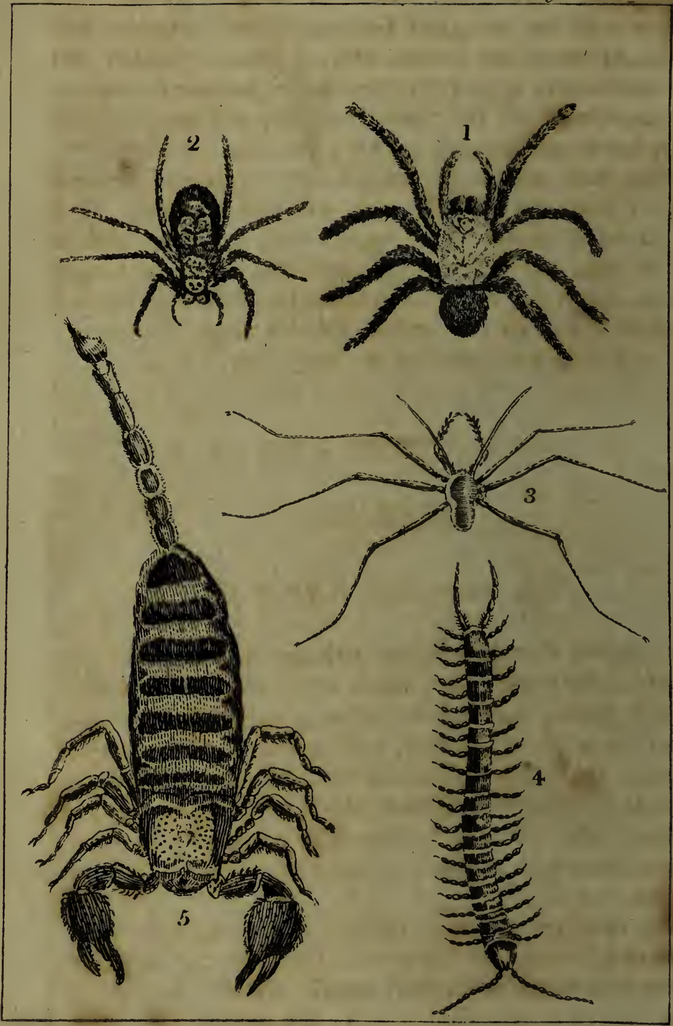
OF INSECTS WITHOUT WINGS.

EVERY moment's obſervation furniſhes us with inſtances of inſects without wings; but the difficulty is to diſtinguiſh thoſe which are condemned continually to lead reptile lives, from ſuch as only wait the happy moment of tranſmutation. For this, nothing but a long and intimate acquaintance will ſuffice; but, in general, all animals reſembling the flea, the louſe, the ſpider, the bug, the wood-louſe the water-louſe, and the ſcorpion, never acquire wings, but are produced from the egg in that form which they never change afterwards.

If we conſider this claſs as diſtinct from others, we ſhall find them in general longer lived than the reſt, and often continuing their term beyond one ſeaſon, which is the ordinary period of an inſect's exiſtence. They ſeem alſo leſs ſubject to the influence of the weather; and often endure the rigours of winter without being numbed into torpidity.— The whole race of moths, butterflies, bees, and flies, are rendered lifeleſs by the return of cold weather; but we need not be told, that the louſe, the flea, and many of theſe wingleſs creatures that ſeem formed to teize mankind, continue their painful depredations the whole year round.

They come to perfection in the egg, as was ſaid before; and it ſometimes happens, that when the animal is interrupted in performing the offices of excluſion, the young ones burſt the ſhell within the parent's body, and are thus brought forth alive. This not unfrequently happens with the wood-louſe, and others of the kind, which are ſometimes ſeen producing eggs, and ſometimes young ones perfectly formed.

Though theſe creatures are perfect from the beginning, yet they are often, during their exiſtence, ſeen to change their ſkin: this is a faculty which they poſſeſs in common with many of the higher ranks of animals, and which anſwers the ſame purpoſes. However tender their ſkins may ſeem to our feel, yet, if compared to the animal's ſtrength



1·2·3 Spiders
4 The Scolopendra
5 The Scorpion

and ſize, they will be found to reſemble a coat of mail, or, to talk more cloſely, the ſhell of a lobſter. By this ſkin theſe animals are defended from accidental injuries, and particularly from the attacks of each other. Within this they continue to grow, till their bodies become ſo large as to be impriſoned in their own covering, and then the ſhell burſts, but is quickly replaced by a new one.

Laſtly, theſe animals are endued with a degree of ſtrength for their ſize, that at firſt might exceed credibility. Had man an equal degree of ſtrength, bulk for bulk, with a louſe or flea, the hiſtory of Samſon would be no longer miraculous. A flea will draw a chain a hundred times heavier than itſelf; and to compenſate for this force, will eat ten times its own ſize of proviſion in a ſingle day.

CHAP. III.

OF THE SPIDER AND ITS VARIETIES.

THE animal that deſerves our firſt notice in this principal order of inſects is the ſpider, whoſe manners are of all others the moſt ſubtle, and whoſe inſtincts are moſt various.—Formed for a life of rapacity, and incapable of living upon any other than inſect food, all its habits are calculated to deceive and ſurpriſe; it ſpreads toils to entangle its prey; it is endued with patience to expect its coming; and is poſſeſſed of arms and ſtrength to deſtroy it when fallen into the ſnare.

In this country, where all the inſect tribes are kept under by human aſſiduity, the ſpiders are but ſmall and harmleſs. We are acquainted with few, but the houſe-ſpider, which weaves its web in neglected rooms; the garden-ſpider, that ſpreads its toils from tree to tree, and reſts in the centre; the wandering-ſpider, that has no abode like the reſt; and the field-ſpider, that is ſometimes ſeen mounting, web and all, into the clouds. Theſe are the chief of our native ſpiders; which, though reputed venomous, are entirely inoffenſive. But they form a much more terrible tribe in Africa and America. In thoſe regions, where all the inſect ſpecies acquire their greateſt growth, where the butterfly is ſeen to expand a wing as broad as our ſparrow, and the ant to build a habitation as tall as a man, it is not to be wondered at that the ſpiders are ſeen bearing a proportionable magnitude. In fact, the bottom of the Martinico ſpider's body is as large as a hen's egg, and covered all over with hair. Its web is ſtrong, and its bite dangerous. It is happy for us, however, that we are placed at a diſtance from theſe formidable creatures, and that we can examine their hiſtory without feeling their reſentment.

Every ſpider has two diviſions in its body. The fore part, containing the head and breaſt, is ſeparated from the hinder part or belly by a very ſlender thread, through which, however, there is communication from one part to the other. The fore part is covered with a hard ſhell, as well as the legs, which adhere to the breaſt. The hinder part is clothed with a ſupple ſkin, beſet all over with hair. They have ſeveral eyes all round the head, brilliant and acute; theſe are ſometimes eight in number, ſometimes but ſix; two behind, two before, and the reſt on each ſide. Like all other inſects, their eyes are immoveable, and they want eye-lids; but this organ is fortified with a tranſparent horny ſubſtance, which at once ſecures and aſſiſts their viſion.—As the animal procures its ſubſiſtence by the moſt watchful attention, ſo large a number of eyes was neceſſary to give it the earlieſt information of the capture of its prey. They have two pincers on the fore-part of the head, rough, with ſtrong points, toothed like a ſaw, and terminating in claws like thoſe of a cat. A little below the point of the claw there is a ſmall hole, through which the animal emits a poiſon, which, though harmleſs to us, is ſufficiently capable of inſtantly deſtroying its prey. This is the moſt powerful weapon they have againſt their enemies; they can open or extend theſe pincers as occaſion may require; and when they are undiſturbed, they ſuffer them to lie one upon the other, never opening them but when there is a neceſſity for their exertion. They have all eight legs, jointed like thoſe of lobſters, and ſimilar alſo in another reſpect; for if a leg be torn away, or a joint cut off, a new one will quickly grow in its place, and the animal will find itſelf fitted for combat as before. At the end of each leg there are three crooked moveable claws; namely, a ſmall one, placed higher up, like a cock's ſpur, by the aſſiſtance of which it adheres to the threads of its web. There are two others larger, which meet together like a lobſter's claw, by which they can catch hold of the ſmalleſt depreſſions, walking up or down the very poliſhed ſurfaces, on which they can find inequalities that are imperceptible to our groſſer ſight. But when they walk upon ſuch bodies as are perfectly ſmooth, as looking glaſs or poliſhed marble, they ſqueeze a little ſponge, which grows near the extremity of their claws, and thus diffuſing a glutinous ſubſtance, adhere to the ſurface until they make a ſecond ſtep. Beſides the eight legs juſt mentioned, theſe animals have two others, which may more properly be called arms as they do not ſerve to aſſiſt motion, but are uſed in holding and managing their prey.

The ſpider, though thus formidably equipped, would ſeldom prove ſucceſsful in the capture, were it not equally furniſhed with other inſtruments to aſſiſt its depredations.—As it lives wholly upon flies, and is without wings to purſue them, it is obvious they muſt for ever eſcape ſo impotent an adverſary; but the ſpider is a moſt experienced hunter, and ſpreads its nets to catch thoſe animals it is unable to purſue. The ſpider's web is generally laid in thoſe places where flies are moſt apt to come and ſhelter; in the corners of rooms, round the edges of windows, and in the open air among the brances of trees. There the little animal remains for days, nay, weeks together, in patient expectation, ſeldom changing its ſituation though never ſo unſucceſsful.

For the purpoſes of making this web, Nature has ſupplied this animal with a large quantity of glutinous matter within its body, and five dugs or teats for ſpinning it into thread. This ſubſtance is contained in a little bag, and at firſt ſight it reſembles ſoft glue; but when examined more accurately, it will be found twiſted into many coils of an agate colour, and upon breaking it, the contents may be eaſily drawn out into threads, from the tenacity of the ſubſtance, not from thoſe threads being already formed. Thoſe who have ſeen the machine by which wire is ſpun, will have an idea of the manner in which this animal forms the threads of its little net, the orifices of the five teats above-mentioned, through which the thread is drawn, contracting or dilating at pleaſure. The threads which we ſee, and appear ſo fine, are, notwithſtanding, compoſed of five joined together, and theſe are many times doubled when the web is in formation.

When a houſe-ſpider propoſes to begin a web, it firſt makes choice of ſome commodious ſpot, where there is an appearance of plunder and ſecurity. The animal then diſtils one little drop of its glutinous liquor, which is very tenacious, and then creeping up the wall, and joining its thread as it proceeds, it darts itſelf in a very ſurpriſing manner, as I have often ſeen, to the oppoſite place, where the other end of the web is to be faſtened. The firſt thread thus formed, drawn tight, and fixed at each end, the ſpider then runs upon it backward and forward, ſtill aſſiduouſly employed in doubling and ſtrengthening it, as upon its force depends the ſtrength and ſtability of the whole. The ſcaffolding thus completed, the ſpider makes a number of threads parallel to the firſt, in the ſame manner, and then croſſes them with others; the clammy ſubſtance of which they are formed, ſerving to bind them, when newly made, to each other. The inſect, after this operation, doubles and trebles the thread that borders its web, by opening alls its teats at once, and ſecures the edges, ſo as to prevent the wind from blowing the work away. The edges being thus fortified, the retreat is next to be attended to; and this is formed like a funnel at the bottom of the web, where the little creature lies concealed. To this are two paſſages, or outlets, one above and the other below, very artfully contrived, to give the animal an opportunity of making excurſions at proper ſeaſons, of prying into every corner, and clearing thoſe parts which are obſerved to be clogged or encumbered. Still attentive to its web, the ſpider, from time to time, cleans away the duſt that gathers round it, which might otherwiſe clog and incommode it: for this purpoſe, it gives the whole a ſhake with its paws; ſtill, however, proportioning the blow ſo as not to endanger the fabric. It often happens alſo, that from the main web there are ſeveral threads extended at ſome diſtance on every ſide; theſe are, in ſome meaſure, the outworks of the fortification, which, whenever touched from without, the ſpider prepares for attack or ſelf-defence. If the inſect impinging be a fly, it ſprings forward with great agility; if, on the contrary, it be the aſſault of an enemy ſtronger than itſelf, it keeps within its fortreſs, and never ventures out till the danger be over. Another advantage which the ſpider reaps from this contrivance of a cell or retreat behind the web, is, that it ſerves for a place where the creature can feaſt upon its game with all ſafety, and conceal the fragments of thoſe carcaſſes which it has picked, without expoſing to public view the leaſt trace of barbarity that might create a ſuſpicion in any inſects that the enemy was near.

If often happens, however, that the wind, or the ruſtling of the branches, or the approach of ſome large animal, deſtroys in a minute the labours of an age. In this caſe, the ſpider is obliged to remain a patient ſpectator of the univerſal ruin; and when the danger is paſſed away, it ſets about repairing the calamity. For this purpoſe, it is furniſhed with a large ſtore of the glutinous ſubſtance of which the web is made; and with this, it either makes a new web, or patches up the old one. In general, however, the animal is much fonder of mending than making, as it is furniſhed originally with but a certain quantity of glutinous matter, which, when exhauſted, nothing can renew. The time ſeldom fails to come, when their reſervoirs are entirely dried up, and the poor animal is left to all the chances of irretrievable neceſſity. An old ſpider is thus frequently reduced to the greateſt extremity; its web is deſtroyed, and it wants the materials to make a new one. But as theſe animals have been long accuſtomed to a life of ſhifting, it hunts about to find out the web of another ſpider, younger and weaker than itſelf, with whom it ventures a battle. The invader generally ſucceeds; the young one is driven out to make a new web, and the old one remains in quiet poſſeſſion. If, however, the ſpider is unable to diſpoſſeſs any other of its web, it then endeavours, for a while, to ſubſiſt upon accidental depredation; but in two or three months it inevitably dies of hunger.

The garden-ſpider ſeems to work in a different manner. The method with this inſect is to ſpin a great quantity of thread, which floating in the air in various directions, happens from its glutinous quality, at laſt to ſtick to ſome object near it, a lofty plant or the branch of a tree. The ſpider only wants to have one end of the line faſt, in order to ſecure and tighten the other. It accordingly draws the line when thus fixed, and then by paſſing and repaſſing upon it, ſtrengthens the thread in ſuch a manner as to anſwer all its intentions. The firſt cord being thus ſtretched, the ſpider walks along a part of it, and there faſtens another, and dropping from thence, faſtens the thread to ſome ſolid body below, then climbs up again and begins a third, which it faſtens by the ſame contrivance. When three threads are thus fixed, it forms a ſquare, or ſomething that very nearly reſembles one; and in this the animal is generally ſeen to reſide. It often happens, however, when the young ſpider begins ſpinning, that its web becomes too bouyant, and not only the thread floats in the air, but even the little ſpinſter. In this manner we have often ſeen the threads of ſpiders floating in the air; and what is ſtill nore ſurpriſing, the young ſpiders themſelves attached to their own web. The reaſon is obvious; for as even gold itſelf may be ſo finely drawn out as to float in the air, ſo the finer thread of a ſpider is ſo buoyant as not only to ſwim in the air, but alſo to lift the ſpider itſelf; which, like the tail of a kite, riſes with its own manufacture.

The ſpider's web being thus completed, and fixed in a proper place, its next care is to ſeize and ſecure whatever inſect happens to be caught in the toil. For this purpoſe, it remains for weeks and even months upon the watch, without ever catching a ſingle fly; for the ſpider, like moſt other inſects, is ſurpriſingly patient of hunger. It ſometimes happens that too ſtrong a fly ſtrikes itſelf againſt the web, and thus, inſtead of being caught, tears the net to pieces. In general, however, the butterfly or the hornet, when they touch the web, fly off again, and the ſpider ſeems no way diſpoſed to interrupt their retreat. The large blue-bottle-fly, the ichneumon-fly, and the common meat fly; ſeem to be its favourite game. When one of theſe ſtrike into the toils, the ſpider is inſtantly ſeen alert and watchful at the mouth of its hole, careful to obſerve whether the fly be completely immeſhed: If that be the caſe the ſpider walks leiſurely forward, ſeizes its prey, and inſtantly kills it by inſtilling a venomous juice into the wound is makes. If, however, the fly be not entirely immeſhed, the ſpider patiently waits, without appearing until its prey has fatigued itſelf by its ſtruggles to obtain its liberty; for if the ravager ſhould appear in all his terrors while the prey is but half involved, a deſperate effort might give it force enough to get free. If the ſpider has faſted for a long time, it then drags the fly immediately into its hole and devours it; but if there has been plenty of game, and the animal be no way preſſed by hunger, it then gives the fly two or three turns in its web, ſo as completely to immeſh it, and there leaves it impotently to ſtruggle until the little tyrant comes to its appetite. Why the ſpider ſhould at one time kill its prey, and at another luffer it to ſtruggle in the toils for ſeveral hours together, I am not able to ſay; perhaps it only likes its prey newly killed, and therefore delays to put the captive to death until it is to be eaten.

It has been the opinion of ſome philoſophers, that the ſpider was in itſelf both male and female; but Liſter has been able to diſtinguiſh the ſexes, and to perceive that the males were much leſs in ſize than the females. But this is not the chief peculiarity; for, different from all other animals, except the fiſh called the *Ray*, it has its inſtruments of generation placed in the fore-arms, which have been already deſcribed. When theſe animals copulate, they for ſome time teize each other with their legs and arms, then appear the inſtruments of generation in the male, as if burſting out from the points of its fore-feet, and are inſerted into the receptacle beneath the body of the female.

The female generally lays from nine hundred to a thouſand eggs in a ſeaſon; they are of a bluiſh colour, ſpeckled with black, and ſeparated from each other by a glutinous ſubſtance, not unlike frog ſpawn water. Theſe eggs are large or ſmall in proportion to the ſize of the animal that produces them. In ſome they are as large as a grain of muſtard-ſeed; in others, they are ſcarcely viſible. The female never begins to lay till ſhe be two years old at the leaſt, and her firſt brood is never ſo numerous as when ſhe has come to her greateſt maturity.

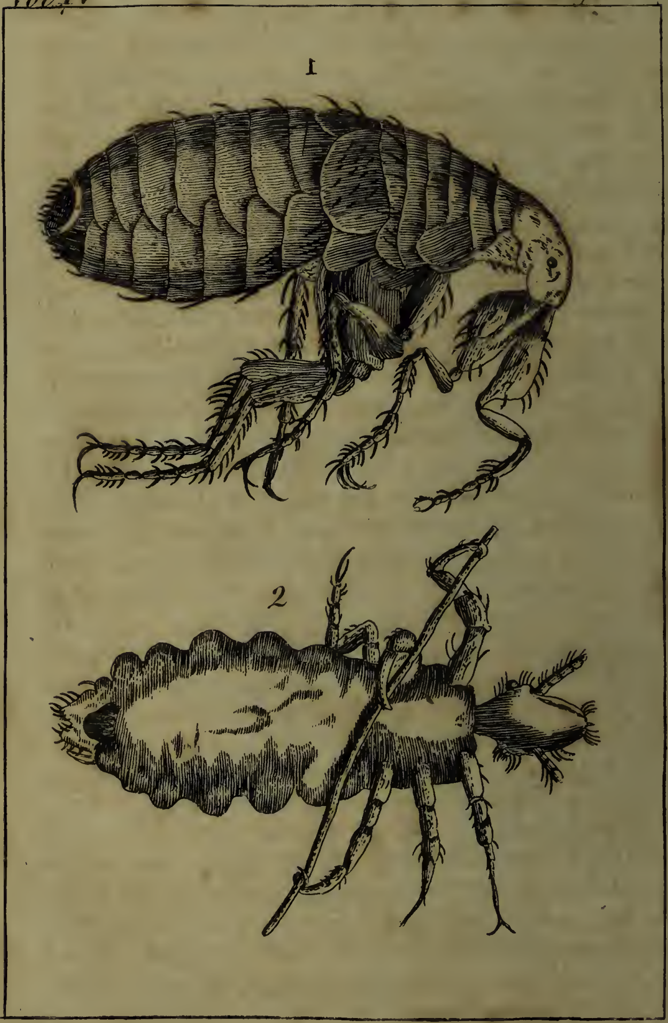
When the number of eggs which the ſpider has brought forth, have remained for an hour or two to dry after excluſion, the little animal then prepares to make them a bag, where they are to be hatched until they leave the ſhell. For this purpoſe, ſhe ſpins a web four or five times ſtronger than that made for catching flies; and beſides, lines it within ſide by a down, which ſhe plucks from her own breaſt. This, bag, when completed, is as thick as paper, is ſmooth within ſide, but rougher without. Within this they depoſit their eggs; and it is almoſt incredible to relate the concern and induſtry which they beſtow in the preſervation of it. They ſtick it by means of their glutinous fluid to the end of the body; ſo that the animal, when thus loaded, appears as if ſhe had one body placed behind another. If this bag be ſeparated from her by any accident, ſhe employs all her aſſiduity to ſtick it again in its former ſituation, and ſeldom abandons her treaſure but with her life. When the young ones are excluded from their ſhells, within the bag, they remain for ſome time in their confinement, until the female, inſtinctively knowing their maturity, bites open their priſon, and ſets them free. But her parental care does not terminate with their excluſion; ſhe receives them upon her back for ſome time, until they have ſtrength to provide for themſelves, when they leave her never to return, and each begins a ſeparate manufactory of its own. The young ones begin to ſpin when they can ſcarely be diſcerned; and prepare for a life of plunder before they have ſtrength to overcome. Indeed, Nature ſeems to have formed them in every reſpect for a life of hoſtility. No other inſect is poſſeſſed of ſuch various powers of aſſault and defence; and they are able to deſtroy animals ten times bigger than themſelves. Even after a ſevere defeat, they quickly recover of their wounds; and as for their legs, they conſider the loſs of them as but a ſmall misfortune, as they grow again very ſpeedily to their former magnitude.

Thus there is no inſect to which they are not an enemy; but what is more barbarous ſtill, ſpiders are the enemies of each other. Mr. Reaumur, who was fond of making experiments upon inſects, tried to turn the labours of the ſpider to human advantage, and actually made a pair of gloves from their webs. For this purpoſe, he collected a large number of thoſe inſects together: he took care to have them conſtantly ſupplied with flies, and the ends of young feathers, freſh picked from chickens and pigeons, which being full of blood, are a diet that ſpiders are particularly fond of. But, notwithſtanding all his care, he was ſoon convinced that it was impracticable to rear them, ſince they were of ſuch a malignant nature, that they could never be brought to live in ſociety; but inſtead of their uſual food, choſe to devour each other. Indeed, were it practicable to reconcile them to each other, it would require too much attendance to rear up a ſufficient number to make the project any way uſeful. Their thread is four, if not five times finer than that of the ſilk-worm; ſo that upon the ſmalleſt calculation, there muſt have been ſixty thouſand ſpiders to make a ſingle pound of ſilk. That which Reaumur made uſe of was only the web in which they depoſited their eggs, which is five times ſtronger than their ordinary manufacture.

Of this animal, there are ſeveral kinds, ſlightly differing from each other, either in habits or conformation. The Water-ſpider is the moſt remarkable of the number. This inſect reſembles the common ſpider in its appearance, except that its hinder part is made rather in the ſhape of a nine-pin than a ball. They differ in being able to live as well by land as water; and in being capable of ſpinning as well in one element as the other. Their appearance under water is very remarkable; for though they inhabit the bottom, yet they are never touched by the element in which they reſide, but are incloſed in a bubble of air that, like a box, ſurrounds them on every ſide. This bubble has the bright appearance, at the bottom, of quickſilver; and within this, they perform their ſeveral functions of eating, ſpinning, and ſleeping, without its ever burſting, or in the leaſt diſturbing their operations: ſometimes, the bubble is ſeen divided into three diſtinct apartments; and in the ſpring, the male enters one of thoſe to impregnate the female in the manner mentioned above, while the bubble in which he was contained unites with the other, like two drops of water, when approached to each other. They ſpin their webs as well in the water as upon land; and it is moſt probable that they make their food of the ſmall inſects of either element.

The Tarantula is alſo of this ſpecies, and deſerves particular notice, not for any remarkable properties that really attend it, but for the numerous falſehoods which have been propagated concerning it. What may be ſaid with truth concerning it is, that it is the largeſt of the ſpider kind known in Europe, and is a native of Apulia in Italy. Its body is three quarters of an inch long, and about as thick as one's little finger; the colour is generally an olive brown, variegated with one that is more duſky; it has eight legs and eight eyes, like the reſt, and nippers, which are ſharp and ſerrated: between theſe and the fore legs, there are two little horns, or feelers, which it is obſerved to move very briſkly when it approaches its prey. It is covered all over the body with a ſoft down, and propagates, as other ſpiders, by laying eggs. In the ſummer months, particularly in the dog days, the tarantula creeping among the corn, bites the mowers and paſſengers: but in winter, it lurks in holes, and is ſeldom ſeen.

Thus far is true; but now the fable begins: for though the bite is attended with no dangerous ſymptoms, and will eaſily cure of itſelf, wonderful ſtories are reported concerning its virulence. The part which is bitten, as we are told, is ſoon after diſcoloured with a livid black, or yellowiſh circle, attended with an inflammation. At firſt the pain is ſcarcely felt; but a few hours after, come on a violent ſickneſs, difficulty of breathing, fainting, and ſometimes trembling. The perſon bit, after this does nothing but laugh, dance, ſkip about, putting himſelf into the moſt extravagant poſtures, and ſometimes alſo is ſeized with a moſt frightful melancholy. At the return of the ſeaſon in which he was bit, his madneſs begins again; and the patient always talks of the ſame things. Sometimes he fancies himſelf a ſhepherd: ſometimes a king; appearing entirely out of his ſenſes. Theſe troubleſome ſymptoms ſometimes return for ſeveral years ſucceſſively, and at laſt terminate in death. But ſo dreadful a diſorder has it ſeems, not been left without a remedy; which is no other than a well-played fiddle. For this purpoſe the medical muſician plays a particular tune, famous for the cure, which he begins ſlow, and increaſes in quickneſs as he ſees the patient affected. The patient no ſooner hears the muſic, but he begins to dance;



1 The Flea
2 The Louſe

and continues ſo doing till he is all over in a ſweat, which forces out the venom that appeared ſo dangerous. This dancing ſometimes continues for three or four hours, before the patient is weary, and before the ſweating is copious enough to cure the diſorder. Such are the ſymptoms related of the tarantula poiſon; ſymptoms which ſome of the beſt and graveſt phyſicians have credited, and attempted to account for. But the truth is, that the whole is an impoſition of the peaſants upon travellers who happen to paſs thro' that part of the country, and who procure a trifle for ſuffering themſelves to be bitten by the tarantula. Whenever they find a traveller willing to try the experiment, they readily offer themſelves, and are ſure to counterfeit the whole train of ſymptoms which muſic is ſuppoſed to remove. A friend of mine, who paſſed through that part of the country, had a truſty ſervant bitten, without ever adminiſtring the muſical cure: the only ſymptoms were a ſlight inflammation, which was readily removed, and no other conſequence ever attended the bite.——It is thus that falſehoods prevail for a century or two; and mankind at laſt begin to wonder how it was poſſible to keep up the deluſion ſo long.

CHAP. IV.

OF THE FLEA.

THE hiſtory of thoſe animals with which we are the beſt acquainted, are the firſt objects of our chiefeſt curioſity.—There are few but are well-informed of the agility and bloodthirſty diſpoſition of the flea; of the caution with which it comes to the attack; and the readineſs with which it avoids the purſuit. This inſect, which is not only the enemy of mankind, but of the dog, cat, and ſeveral other animals, is found in every part of the world, but bites with greater ſeverity in ſome countries than in others. Its numbers in Italy and France are much greater than in England; and yet its bite is much more troubleſome here, than I have found it in any other place. It would ſeem that its force increaſed with the coldneſs of the climate; and, though leſs prolific, that it became more predaceous.

If the flea be examined with a microſcope, it will be obſerved to have a ſmall head, large eyes and a roundiſh body. It has two feelers, or horns, which are ſhort, and compoſed of four joints; and between theſe lies its trunk, which it buries in the ſkin, and through which it ſucks the blood in large quantities. The body appears to be all over curiouſly adorned with a ſuit of poliſhed ſable armour, neatly jointed, and beſet with multitudes of ſharp pins, almoſt like the quills of a porcupine. It has ſix legs, the joints of which are ſo adapted, that it can, as it were, fold them up one within another; and when it leaps, they all ſpring out at once, whereby its whole ſtrength is exerted, and the body raiſed above two hundred times its own diameter.

The young fleas are at firſt a ſort of nits or eggs, which are round and ſmooth; and from theſe proceed white worms, of a ſhining pearl colour: in a fortnight's time they come to a tolerable ſize, and are very lively and active; but if they are touched at this time, they roll themſelves up in a ball: ſoon after this they begin to creep like ſilk-worms that have no legs; and then they ſeek a place to lie hid in, where they ſpin a ſilken thread from their mouth, and with this they incloſe themſelves in a ſmall round bag or caſe, as white within as writing-paper, but dirty without: in this they continue for a fortnight longer; after which they burſt from their confinement perfectly formed, and armed with powers to diſturb the peace of an emperor.

CHAP. V.

OF THE LOUSE AND ITS VARIETIES.

THE antipathies of mankind are various; ſome conſidering the toad, ſome the ſerpent, ſome the ſpider, and ſome the beetle, with a ſtrong degree of deteſtation: but while all wonder at the ſtrangeneſs of each other's averſions, they all ſeem to unite in their diſlike to the louſe, and regard it as their natural and moſt nauſeous enemy. Indeed, it ſeems the enemy of man in the moſt odious degree; for wherever wretchedneſs, diſeaſe, or hunger, ſeize upon him, the louſe ſeldom fails to add itſelf to the tribe, and to increaſe in proportion to the number of his calamities.

In examining the human louſe with the microſcope, its external deformity firſt ſtrikes us with diſguſt: the ſhape of the fore part of the head is ſomewhat oblong; that of the hind part ſomewhat round: the ſkin is hard, and being ſtretched, tranſparent, with here and there ſeveral briſtly hairs: in the fore part is a proboſcis or ſucker, which is ſeldom viſible: on each ſide of the head are antennæ, or horns, each divided into five joints, covered with briſtly hair; and ſeveral white veſſels are ſeen through theſe horns: behind theſe are the eyes, which ſeem to want thoſe diviſions obſervable in other inſects, and appear encompaſſed with ſome few hairs: the neck is very ſhort, and the breaſt is divided into three parts; on each ſide of which are placed ſix legs, conſiſting of ſix joints, covered alſo with briſtly hairs; the ends of the legs are armed with two ſmaller and larger ruddy claws, ſerving thoſe inſects as a finger and thumb, by which they catch hold of ſuch objects as they approach: the end of the body terminates in a cloven tail, while the ſides are all over hairy; the whole reſembling clear parchment, and, when roughly preſſed, cracking with a noiſe.

When we take a cloſer view, its white veins, and other internal parts appear; as likewiſe a moſt wonderful motion in its inteſtines, from the tranſparency of its external covering. When the louſe feeds, the blood is ſeen to ruſh, like a torrent, into the ſtomach; and its greedineſs is ſo great, that the excrements contained in the inteſtines are ejected at the ſame time, to make room for this new ſupply.

The louſe has neither beak, teeth, nor any kind of mouth, as Dr. Hooke deſcribed it, for the entrance into the gullet is abſolutely cloſed. In the place of all theſe, it has a proboſcis or trunk; or, as it may be otherwiſe called, a pointed, hollow ſucker, with which it pierces the ſkin, and ſucks the human blood, taking that for food only. The ſtomach is lodged partly in the breaſt and back; but the greateſt portion of it is in the abdomen. When ſwolen with blood, it appears of a dark brown colour, which is viſible through the ſkin; and is either a faint red, or a full or bright brown, as the contents of the ſtomach are more or leſs changed. When it is empty, it is colourleſs; but when filled, it is plainly diſcernible, and its motion ſeems very extraordinary. It then appears working with very ſtrong agitations and ſomewhat reſembles an animal within an animal. Superficial obſervers are apt to take this for the pulſation of the heart; but if the animal be obſerved when it is ſucking, it will then be found that the food takes a direct paſſage from the trunk to the ſtomach, where the remainder of the old aliment will be ſeen mixing with the new, and agitated up and down on every ſide.

If this animal be kept from food two or three days, and then placed on the back of the hand, or any ſoft part of the body, it will immediately ſeek for food; which it will the more readily find, if the hand be rubbed till it grows red.—The animal then turns its head, which lies between the two fore-legs to the ſkin, and diligently ſearches for ſome pore: when found, it fixes the trunk therein; and ſoon the microſcope diſcovers the blood aſcending through the head, in a very rapid, and even frightful ſtream. The louſe has at that time ſufficient appetite to feed in any poſture; it is then ſeen ſucking with its head downward, and its tail elevated. If, during this operation, the ſkin be drawn tight, the trunk is bound faſt, and the animal is incapable of diſengaging itſelf; but it more frequently ſuffers from its gluttony, ſince it gorges to ſuch a degree, that it is cruſhed to pieces by the ſlighteſt impreſſion.

Whether lice are diſtinguiſhed by the parts of generation into males and females is not yet diſcovered: Swammerdam is inclined to think that they are hermaphrodites, having found an ovary in all thoſe he examined; and he diſſected not leſs than forty-two. In one of theſe animals were found ten large eggs; and forty-four ſmaller, that were not yet come to their full perfection.

There is ſcarce any animal that multiplies ſo faſt as this unwelcome intruder. It has been pleaſantly ſaid, that a louſe becomes a grandfather in the ſpace of twenty-four hours: this fact cannot be aſcertained; but nothing is more true than that the moment the nit, which is no other than the egg of the louſe, gets rid of its ſuperfluous moiſture, and throws off its ſhell, it then begins to breed in its turn. Nothing ſo much prevents the increaſe of this nauſeous animal as cold and want of humidity; the nits muſt be laid in a place that is warm, and moderately moiſt, to produce any thing. This is the reaſon that many nits laid on the hairs in the night-time, are deſtroyed by the cold of the ſucceeding day; and ſo ſtick for ſeveral months, till they at laſt come to loſe even their external form.

The louſe is found upon every part of the human body; but particularly in the heads of children. Thoſe found upon the miners in Sweden, are ſaid by Linnæus to be very large; and he is of opinion that the head and the body-louſe differ in no reſpect from each other. The pthiriaſis, or louſy diſeaſe, though very little known at preſent, was frequent enough among the ancients: Herod, Antiochus, Epiphanes, Alcman the poet, Pherecydes, Caſſander, Calliſthenes, and Sylla, all died of this diſorder. The uſe of mercury, which was unknown among the ancients, may probably have baniſhed it from among the moderns; for certain it is, that thoſe animals ſeldom attack any in our climate, but ſuch as from ſloth or famine invite their company.

Such is the hiſtory of the human louſe, which, from its connection with mankind, deſerves firſt notice: but it would be endleſs to deſcribe the various tribes that go under this name, and ſwarm upon every part of Nature. There is ſcarce an animal, and ſcarce even a vegetable, that does not ſuffer under its own peculiar louſe. The ſheep, the horſe, the hog, and the elephant, are all teaſed by them; the whale, the ſhark, the ſalmon, and the lobſter, are not without their company; while every hot-houſe, and every garden is infeſted with ſome peculiarly deſtructive. Linnæus tells us, that he once found a vegetable-louſe upon ſome plants newly arrived from America; and, willing to trace the little animal through its various ſtages, he brought it with him from London to Leyden, where he carefully preſerved it during the winter, until it bred in the ſpring; but the louſe it ſeems did not treat him with all the gratitude he expected; for it became the parent of ſo numerous a progeny, that it ſoon overrun all the phyſic-garden of that beautiful city; and leaves to this day, many a gardener to curſe the Swede's too indulgent curioſity.

The animal which ſome have called the Leaf Louſe, is of the ſize of a flea, and of a bright green, or bluiſh-green colour; the body is nearly oval, and is largeſt and moſt convex on the hinder part; the breaſt is very ſmall, and the head is blunt and green: the eyes may be ſeen very plainly, being prominent on the fore part of the head, and of a ſhining black colour; near theſe there is a black line on each ſide; and the legs are very ſlender.

Theſe animals are uſually found upon the leaves of the orache, and other plants; and the weaker the leaves and buds are, theſe inſects ſwarm upon them in greater abundance. Some plants are covered over with them; though they are not the cauſe of the plant's weakneſs, but the ſign: however, by wounding and ſucking the leaf, they increaſe the diſeaſe. They generally aſſume their colour from the plant on which they reſide. Thoſe that feed upon pot-herbs and plum-trees, are of an aſh-colour; only they are greeniſh when they are young: thoſe that belong to the alder and cherry-tree, are black; as alſo thoſe upon beans, and ſome other plants: thoſe on the leaves of apples and roſe-trees, are white; but as they leap, like graſshoppers, ſome place them in the number of the flea kind. The moſt uncommon colour is reddiſh; and lice of this ſort may be found on the leaves of tanſey; and their juice, when rubbed in the hands, tinges them with no diſagreeable red. All theſe live upon their reſpective plant; and are often engendered within the very ſubſtance of the leaf.

All theſe bring forth their young alive; and the fœtus, when it is ready to be brought forth, entirely fills the belly of the female; its fore parts being excluded firſt, and then the hinder. The young one does not begin to move till the horns or feelers appear out of the body of the old one; and by the motion of theſe it firſt ſhews ſigns of life, moving them in every direction, and bending all their joints. When the horns and head are excluded, the two fore-feet follow, which they move with equal agility; after this follow the middle-feet, and then the hinder: ſtill, however, the young one continues ſticking to its parent, ſupported only at one extremity, and hanging, as it were in air, until its ſmall and ſoft members become hardened and fitted for ſelf-ſupport.— The parent then gets rid of its burthen; by moving from the place where ſhe was ſitting, and forcing the young one to ſtand upon its legs, leaves it to ſhift for itſelf.

As the animal has not far to go, its proviſion lying beneath it, during the ſummer it continues to eat and creep about with great agility. But as it is viviparous, and muſt neceſſarily lurk ſomewhere in winter, where its body may be defended from the cold, it endeavours to ſecure a retreat, near the trees or plants that ſerve to nouriſh it in the beginning of ſpring. They never hide themſelves in the earth, like many other inſects, becauſe they have no part of their bodies fitted to remove the earth; nor can they creep into every chink, as their legs are too long: beſides, their bodies are ſo tender, that the leaſt rough particle of the earth would hurt them. They, therefore, get into the deep chinks of the bark, and into the cavities of the ſtronger ſtalks, from thence they ſally out upon the branches and leaves, when the warmth of the ſun begins to be felt. Neither the cold in the autumnal ſeaſon nor the leſſer degree of heat in the ſpring, ever hurts them; they ſeldom, therefore, ſeek for hiding-places before the fall of the leaf, and are alert enough to take the earlieſt advantage of the returning ſpring.

Like many other inſects, they caſt their ſkins four ſeveral times; and, what is very remarkable, the males have four wings, but the females never have any. They all have long legs, not only to enable them to creep over the long hairs of plants and leaves, but alſo to travel from one tree to another, when they happen to ſtand at a diſtance. Their trunk or ſnout lies under their breaſt; and this they thruſt into the pores of the plant to ſuck out the juice, for they do not gnaw them, like the caterpillar; but ſo hurt them by ſucking, that the leaves become ſpotted, and as it were overrun with ſcabs; for which reaſon their edges always turn up towards the middle.

It has been ſaid, that theſe inſects are often carried away and devoured by ants; but this Fryſch, from whom this deſcription is taken, could never obſerve. The ants, indeed, are fond of thoſe trees where there is a great number of thoſe inſects; but then it is only to ſuck the juice which flows from the leaves that have been juſt wounded. This more particularly happens in the heat of ſummer, when other moiſture is wanting: however, he never found them hurting or carrying away any of theſe inſects while alive; nor, indeed, were they able, for the leaf-louſe is more than a match for the ant at ſingle combat. Whenever they perceive the ant approaching behind them, they kick back with their hinder-feet, and thus drive off the invader, as a horſe would a lion.

The three principal and conſtant enemies to theſe inſects are, firſt, the fire-fly, which lays its eggs where theſe inſects are in greateſt number, which, producing a worm, ſeizes and devours all the leaf-lice that come near it: another enemy is the worm of a peculiar kind of beetle, which deſtroys them in great numbers: but the moſt formidable of all enemies, is the ichneumon fly, that ſeizes upon one of the largeſt females, and laying its egg upon her, this is hatched into a worm, which ſoon devours and deſtroys the animal from whoſe body it ſprung.

CHAP. VI.

OF THE BUG AND ITS VARIETIES.

THE bug is another of thoſe nauſeous inſects that intrude upon the retreats of mankind; and often baniſh that ſleep, which even ſorrow and anxiety permitted to approach. This, to many men, is of all other inſects, the moſt troubleſome and obnoxious. The night is uſually the ſeaſon when the wretched have reſt from their labour; but this ſeems the only ſeaſon when the bug iſſues from its retreats, to make its depredations. By day it lurks, like a robber, in the moſt ſecret parts of the bed; takes the advantage of every chink and cranny, to make a ſecure lodgment; and contrives its habitation with ſo much art, that ſcarce any induſtry can diſcover its retreat. It ſeems to avoid the light with great cunning; and even if candles be kept burning, this formidable inſect will not iſſue from its hiding-place. But when darkneſs promiſes ſecurity, it then iſſues from every corner of the bed, drops from the teſter, crawls from behind the arras, and travels with great aſſiduity to the unhappy patient, who vainly wiſhes for reſt and refreſhment. It is generally vain to deſtroy one only, as there are hundreds more to revenge their companion's fate; ſo that the perſon who thus is ſubject to be bitten, remains the whole night like a centinel upon duty, rather watching the approach of freſh invaders, than inviting the pleaſing approaches of ſleep.

Nor are theſe inſects leſs diſagreeable from their nauſeous ſtench, than their unceaſing appetites. When they begin to crawl, the whole bed is infected with the ſmell; but if they are accidentally killed, then it is inſupportable.

Theſe are a part of the inconveniences that reſult from the perſecution of theſe odious inſects: but happily for Great Britain, they multiply leſs in theſe iſlands, than in any part of the continent. In France and Italy the beds, particularly in their inns, ſwarm with them; and every piece of furniture ſeems to afford them a retreat. They grow larger alſo with them than with us, and bite with more cruel appetite.

This animal, if examined minutely, appears to conſiſt of three principal parts; the head, the corſelet, and the belly. It has two brown eyes, that are very ſmall, and a little prominent, beſides two feelers, with three joints: underneath theſe there is a crooked trunk, which is its inſtrument of torture, and which, when in motion, lies cloſe upon the breaſt. The breaſt is a kind of ring, in which are placed the two firſt pair of legs. The belly conſiſts of nine rings; under which are placed two pair of legs more, making ſix in all. Each leg has three joints, which form the thigh, the leg, and the food, which is armed with a crooked claw, like a hook. The body is ſmooth, except a few ſhort hairs, that may be ſeen by the microſcope, about the vent, and on the two laſt rings. Its motion is ſlow and unwieldy; yet its ſight is ſo exquiſite, that the inſtant it perceives the light, it generally makes good its retreat; and they are ſeldom caught, though the bed ſwarms with them.

If we examine this inſect internally, we ſhall find the great artery, which in all inſects performs the functions of the heart; we ſhall find the apertures of the lungs on the right ſide and the left, through which the animal breathes;

we ſhall find a ſtomach and inteſtines, which, as in other animals, run from the mouth to the anus. If the inſect has been kept long faſting, there will be a mucus found in its body, like the white of an egg; but if cruſhed after a full meal, the human blood which it has ſucked in, will appear a little darkened, by having paſſed through the inſect's body.

The male and female of theſe animals are plainly diſtinguiſhable from each other; and the parts of generation are obvious enough. They are often found coupling tail to tail; and in this ſtate are very eaſily deſtroyed. The female has an ovary filled with eggs, joined together like a bunch of grapes; each egg being oblong, almoſt cylindrical, inclining to white, and pretty tranſparent. In about two days after impregnation by the male, ſhe depoſits her eggs to the number of about a hundred and fifty, in ſome convenient place where they are likely to receive no diſturbance. There they continue for ſome months; during which time, neither cold nor heat, neither moiſture nor fumigation, can in the leaſt retard their excluſion; but they come forth active, and ready for miſchief. It is this hardineſs in the ſhell that ſeems to continue the breed; as the old ones die every winter, or are eaſily deſtroyed by any fumigation that is uſed for that purpoſe. But the eggs ſeem incapable of deſtruction; even thoſe men who make a livelihood by killing theſe nauſeous inſects, though they can anſwer for the parent, can never be ſure of the egg. For this reaſon they uſually pay thoſe houſes to which they are called a ſecond or a third viſit, and at laſt exterminate them by perſeverance.

The manner of deſtroying them ſeems rather the effects of aſſiduity than antidote; for the men called in upon this occaſion, take every part of the furniture aſunder, bruſh every part of it with great aſſiduity, anoint it with a liquid, which I take to be a ſolution of corroſive ſublimate, and having performed this operation twice or thrice, the vermin are moſt uſually deſtroyed.

Cleanlineſs, therefore, ſeems to be the beſt antidote to remove theſe nauſeous inſects; and wherever that is wanting, their increaſe ſeems but a juſt puniſhment. Indeed, they are ſometimes found in ſuch numbers among old furniture, and neglected chambers, expoſed to the ſouth, that, wanting other ſuſtenance, they devour each other. They are alſo enemies to other vermin, and deſtroy fleas very effectually; ſo that we ſeldom have the double perſecution of different vermin in the ſame bed. Of the bug kind Linnæus reckons up forty.

CHAP. VII.

OF THE WOOD-LOUSE AND ITS VARIETIES.

THE common wood-louſe is ſeldom above half an inch long, and a quarter of an inch broad. The colour is of a livid black, eſpecially when found about dunghills, and on the ground; but thoſe that are to be met with under tiles, and in drier places, are of the colour of the hair of an aſs.—It has fourteen feet, ſeven on each ſide; and they have only one joint each, which is ſcarcely perceivable. It has two ſhort feelers, and the body is of an oval ſhape. When it is touched, it rolls itſelf up into a ſort of a ball; and the ſides near the feet are dentated like a ſaw. It is often found among rotten timber, and on decayed trees; in winter it lies hid in the crevices of walls and all ſorts of buildings. The male is eaſily diſtinguiſhable from the female, being leſs and more ſlender. The eggs they lay are white and ſhining, like ſeed pearls and are very numerous: however, more properly ſpeaking, although, when excluded, the young have all the appearance of an egg, yet they are alive, and without throwing off any ſhell, ſtir and move about with great vivacity; ſo that this animal may properly be ſaid to be viviparous. The little worms at firſt ſeem ſcarce able to ſtir; but they ſoon feed, and become very briſk. Theſe animals are of great uſe in medicine: being impregnated with a ſaline quality, which is diuretic and ſtimulating. Of this inſect, Linnæus makes three ſpecies.

CHAP. VIII.

OF THE MONOCULUS; OR, ABORESCENT WATER-FLEA.

THIS animal, which is of the ſize of a flea, appears to the ſight, unaſſiſted by the microſcope, to have but one eye; for the eyes, by reaſon of the ſmallneſs of the head, ſeem to be joined to each other: they are ſituated in the trunk of this inſect, and the beak is likewiſe very ſmall and ſharp-pointed. The ſtructure of the eye is ſeen, by the microſcope, to be reticulated, or made like a net; and the trunk of this inſect, by which it feeds, is not only ſmall and ſharp, but alſo tranſparent. The inſects are of a blood red colour; and ſometimes are ſeen in ſuch multitudes on the ſurface of ſtanding water, as to make them appear all over red, whence many fanciful people have thought the water to be turned into blood.

Swammerdam tells us of a celebrated profeſſor of Leyden, who was at firſt aſtoniſhed by an appearance of this kind.—Being once intent upon his ſtudies, he heard a noiſe, of which, as it increaſed by degrees, he was deſirous to know the cauſe. The maid-ſervant attending to his ſummons, appeared quite petrified with fear, and told him with a tremulous voice, that all the waters of Leyden were turned into blood! Upon this he went directly, in a ſmall bark, to the place where the water was thus changed, and put ſome of the bloody water into a glaſs; but upon viewing it with attention, he obſerved, that it abounded with infinite numbers of theſe little red inſects, which tinged the whole body of the fluid with that ſeemingly formidable colour.—Thus his ſudden fright was changed into laſting admiration.

Of all parts of this animal, its branching arms, and the motion it makes with them in the water, deſerve our greateſt attention. By theſe the little creature can move in a ſtraight line; waving its arms, as a bird does its wings in the air, ſometimes upward, ſometime downward, ſometimes to the right, ſometimes to the left, yet ſtill continuing to proceed in a right line. By ſtriking the water with its arms, it can aſcend with great velocity; and by ſtriking in a contrary direction, it dives with equal eaſe. As theſe motions are very rapid, the little animal appears to jump in the water, its head always tending to the ſurface, and its tail ſtretched downward. This inſect is produced from an egg, which, when, excluded, is carried on the back of the female, and ſoon is ſeen floating in the water round her. Its appearance at firſt is that of a very ſmall whitiſh inſect, endued with a very nimble motion. Except in colour, it ſuffers no change, only continuing to grow larger and redder, as it grows old. They ſometimes remain ſeveral days on the ſurface of the water; and ſometimes are ſeen at the bottom only; but they are never at reſt. They change their ſkin, like moſt other inſects; and the caſt ſkin reſembles the inſect itſelf ſo exactly, that one might miſtake the maſk for the animal.

CHAP. IX.

OF THE SCORPION AND ITS VARIETIES.

THERE is ſcarce an inſect without wings that is not obnoxious to man: the ſmalleſt have the power of annoying him, either by biting or ſtinging him; and though each is in itſelf contemptible, they become formidable from their numbers. But of all this claſs, there is none ſo terrible as the Scorpion, whoſe ſhape is hideous, whoſe ſize among the inſect tribe is enormous, and whoſe ſting is generally fatal. Happy for England the ſcorpion is entirely a ſtranger among us! In ſeveral parts of the continent of Europe it is but too well known, though it ſeldom grows above four inches long: but in the warm tropical climates, it is ſeen a foot in length, and in every reſpect as large as a lobſter.

The ſcorpion is one of the largeſt of the inſect tribe, and not leſs terrible from its ſize than its malignity. It reſembles a lobſter ſomewhat in ſhape, but is infinitely more hideous. There have been enumerated nine different kinds of this dangerous inſect, chiefly diſtinguiſhed by their colour; there being ſcorpions yellow, brown, and aſh-coloured; others that are the colour of ruſty iron, green, pale yellow, black, claret-colour, white, and grey.

There are four principal parts diſtinguiſhable in this animal; the head, the breaſt, the belly, and the tail. The ſcorpion's head ſeems, as it were, jointed to the breaſt; in the middle are ſeen two eyes; and a little more forward, two eyes more, placed in the fore-part of the head: theſe eyes are ſo ſmall, that they are ſcarcely perceivable; and it is probable the animal has but little occaſion for ſeeing. The mouth is furniſhed with two jaws; the undermoſt is divided into two, and the parts notched into each other, which ſerves the animal as teeth, and with which it breaks its food, and thruſts it into its mouth: theſe the ſcorpion can at pleaſure pull back into its mouth, ſo that no part of them can be ſeen. On each ſide of the head are two arms, each compoſed of four joints; the laſt of which is large, with ſtrong muſcles, and made in the manner of a lobſter's claw. Below the breaſt are eight articulated legs, each divided into ſix joints; the two hindmoſt of which are each provided with two crooked claws, and here and there covered with hair. The belly is divided into ſeven little rings; from the loweſt of which is continued a tail compoſed of ſix joints, which are briſtly and formed like little globes, the laſt being armed with a crooked ſting. This is that fatal inſtrument which renders this inſect ſo formidable: it is long, pointed, hard, and hollow; it is pierced near the baſe by two ſmall holes, through which, when the animal ſtings, it ejects a drop of poiſon, which is white, cauſtic, and fatal. The reſervoir in which this poiſon is kept, is in a ſmall bladder near the tail, into which the venom is diſtilled by a peculiar apparatus. If this bladder be gently preſſed, the venom will be ſeen iſſuing out through the two holes above-mentioned; ſo that it appears, that when the animal ſtings, the bladder is preſſed, and the venom iſſues through the two apertures into the wound.

There are few animals more formidable, or more truly miſchievous than the ſcorpion. As it takes refuge in a ſmall place, and is generally found ſheltering in houſes, ſo it cannot be otherwiſe than that it muſt frequently ſting thoſe among whom it reſides. In ſome of the towns of Italy, and in France, in the province of Languedoc, it is one of the greateſt peſts that torment mankind: but its malignity in Europe is trifling, when compared to what the natives of Africa and the Eaſt are known to experience. In Batavia, where they grow twelve inches long, there is no removing any piece of furniture, without the utmoſt danger of being ſtung by them. Boſman aſſures us, that, along the Gold Coaſt, they are often found larger than a lobſter; and that their ſting is inevitably fatal. In Europe, however, they are by no means ſo large, ſo venomous, nor ſo plentiful. The general ſize of this animal does not exceed two or three inches; and its ſting is very ſeldom found to be fatal. Maupertuis, who made ſeveral experiments on the ſcorpion of Languedoc, found it by no means ſo invariably dangerous as had till then been repreſented. He provoked one of them to ſting a dog, in three places of the belly, where the animal was without hair: in about an hour after the poor animal ſeemed greatly ſwolen, and became very ſick: he then caſt up whatever he had in his bowels; and for about three hours continued vomiting a whitiſh liquid. The belly was always greatly ſwolen, when the animal began to vomit; but this operation always ſeemed to abate the ſwelling; which alternately ſwelled and was thus emptied for three hours ſucceſſively. The poor animal, after this, fell into convulſions, bit the ground, dragged himſelf along upon his fore-feet, and at laſt died, five hours after being bitten. He was not partially ſwolen round the place which was bitten, as is uſual after the ſting of a waſp or a bee; but his whole body was inflated, and there only appeared a red ſpot on the places where he had been ſtung.

Some days after, however, the ſame experiment was tried upon another dog, and even with more aggravated cruelty; yet the dog ſeemed no way affected by the wounds, but howling a little when he received them, continued alert and well after them; and ſoon after was ſet at liberty, without ſhewing the ſmalleſt ſymptoms of pain. So far was this poor creature from being terrified at the experiment, that he left his own maſter's houſe, to come to that of the philoſopher, where he had received more plentiful entertainment. The ſame experiment was tried by freſh ſcorpions, upon ſeven other dogs, and upon three hens; but not the ſmalleſt deadly ſymptoms was ſeen to enſue. From hence it appears that many circumſtances, which are utterly unknown, muſt contribute to give efficacy to the ſcorpion's venom. Whether its food, long faſting, the ſeaſon, the nature of the veſſels it wounds, or its ſtate of maturity, contribute to, or retard its malignity, is yet to be aſcertained by ſucceeding experiment. In the trials made by our philoſopher, he employed ſcorpions of both ſexes, newly caught, and ſeemingly vigorous and active. The ſucceſs of this experiment may ſerve to ſhow that, many of thoſe boaſted antidotes which are given for the cure of the ſcorpion's ſting, owe their ſucceſs rather to accident than their own efficacy. They only happened to cure, when their ſting was no way dangerous; but in caſes of actual malignity, they might probably be utterly unſerviceable.

The ſcorpion of the tropical climates being much larger than the former, is probably much more venomous. Helbigius, however, who reſided for many years in the Eaſt, aſſures us, that he was often ſtung by the ſcorpion, and never received any material injury from the wound: a painful tumour generally enſued; but he always cured it, by rubbing the part with a piece of iron or ſtone, as he had ſeen the Indians practiſe before him, until the fleſh became inſenſible. Seba, Moore, and Boſman, however, give a very different account of the ſcorpion's malignity; and aſſert that, unleſs ſpeedily relieved, the wound becomes fatal.

It is certain that no animal in the creation ſeems endued with ſuch an iraſcible nature. I have often ſeen them taken and put into a place of ſecurity, exerting all their rage againſt the ſides of the glaſs veſſel that contained them. I have ſeen them attempt to ſting a ſtick, when put near them; and attack a mouſe or a frog, while thoſe animals were far from offering any injury. Maupertuis put three ſcorpions and a mouſe into the ſame veſſel together, and they ſoon ſtung the little animal in different places. The mouſe, thus aſſaulted, ſtood for ſome time upon the defenſive, and at laſt killed them all, one after another. He tried this experiment, in order to ſee whether the mouſe, after it had killed, would eat the ſcorpions; but the little quadruped ſeemed entirely ſatisfied with the victory, and even ſurvived the ſeverity of the wounds it had received: Wolkamer tried the courage of the ſcorpion againſt the large ſpider, and incloſed ſeveral of both kinds in glaſs veſſels, for that purpoſe*. The ſucceſs of this combat was very remarkable. The ſpider at firſt uſed all its efforts to immeſh the ſcorpion in its web, which it immediately began ſpinning; but the ſcorpion reſcued itſelf from the danger, by ſtinging its adverſary to death; it ſoon after cut off, with its claws, all the legs of the ſpider, and then ſucked all the internal parts at its leiſure. If the ſcorpion's ſkin had not been ſo hard, Wolkamer is of opinion that the ſpider would have obtained the victory; for he had often ſeen one of theſe ſpiders deſtroy a toad.

The fierce ſpirit of this animal is equally dangerous to its own ſpecies; for ſcorpions are the cruelleſt enemies to each other. Maupertuis put about a hundred of them together in the ſame glaſs; and they ſcarce came into contact, when they began to exert all their rage in mutual deſtruction: there was nothing to be ſeen but one univerſal carnage, without any diſtinction of age or ſex; ſo that in a few days there remained only fourteen, which had killed and devoured all the reſt.

But their unnatural malignity is ſtill more apparent in their cruelty to their offspring. He encloſed a female ſcorpion, big with young, in a glaſs veſſel, and ſhe was ſeen to devour them as faſt as they were excluded: there was but one only of the number that eſcaped the general deſtruction, by taking refuge on the back of its parent; and this ſoon after revenged the cauſe of its brethren, by killing the old one in its turn.

Such is the terrible and unrelenting nature of this inſect, which neither the bonds of ſociety, nor of Nature can reclaim: it is even aſſerted that, when driven to an extremity, the ſcorpion will often deſtroy itſelf. The following expement was ineffectually tried by Maupertuis: but I am ſo well aſſured of it by many eye-witneſſes, who have ſeen it both in Italy and America, that I have no doubt remaining of its veracity. A ſcorpion, newly caught, is placed in the midſt of a circle of burning charcoal, and thus an egreſs prevented on every ſide: the ſcorpion, as I am aſſured, runs for about a minute round the circle, in hopes of eſcaping; but finding that impoſſible, it ſtings itſelf on the back of the head, and in this manner the undaunted ſuicide inſtantly expires.

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* Ephemerides Dec. II. 1687. Obſerv. 224.

It is happy for mankind that theſe animals are thus deſtructive to each other; ſince otherwiſe they would multiply in ſo great a degree as to render ſome countries uninhabitable. The male and female of this inſect are very eaſily diſtinguiſhable; the male being ſmaller and leſs hairy. The female brings forth her young alive, and perfect in their kind. Rhedi having bought a quantity of ſcorpions, ſelected the females, which by their ſize and roughneſs were eaſily diſtinguiſhable from the reſt, and putting them in ſeparate glaſs veſſels, he kept them for ſome days without food. In about five days one of them brought forth thirty-eight young ones, well ſhaped, and of a milk-white colour, which changed every day more and more into a dark ruſty hue. Another female, in a different veſſel, brought forth twenty-ſeven of the ſame colour; and the day following the young ones ſeemed all fixed to the back and belly of the female. For near a fortnight all theſe continued alive and well; but afterwards ſome of them died daily: until, in about a month, they all died except two.

Were it worth the trouble, theſe animals might be kept living as long as curioſity ſhould think proper. Their chief food is worms and inſects; and upon a proper ſupply of theſe, their lives might be lengthened to their natural extent. How long that may be we are not told; but if we may argue from analogy, it cannot be leſs than ſeven or eight years; and perhaps, in the larger kind, double that duration. As they have ſomewhat the form of the lobſter, ſo they reſemble that animal in caſting their ſhell, or more properly their ſkin; ſince it is ſofter by far than the covering of the lobſter, and ſet with hairs, which grow from it in great abundance, particularly at the joinings. The young lie in the womb of the parent, each covered up in its own membrane, to the number of forty or fifty, and united to each other by an oblong thread, ſo as to exhibit altogether the form of a chaplet.

Such is the manner in which the common ſcorpion produces its young; but there is a ſcorpion of America, produced from the egg, in the manner of the ſpider. The eggs are no larger than pin-points; and they are depoſited in a web, which they ſpin from their bodies, and carry about with them, till they are hatched. As ſoon as the young ones are excluded from the ſhell, they get upon the back of the parent, who turns her tail over them, and defends them with her ſting. It ſeems probable, therefore, that captivity produces that unnatural diſpoſition in the ſcorpion, which induces it to deſtroy its young; ſince, at liberty, it is found to protect them with ſuch unceaſing aſſiduity.

CHAP. X.

OF THE SCOLOPENDRA AND GALLY-WORM.

OF theſe hideous and angry inſects we know little, except the figure and the noxious qualities. Though with us there are inſects ſomewhat reſembling them in form, we are placed at a happy diſtance from ſuch as are really formidable. With us they ſeldom grow above an inch long; in the tropical climates they are often found above a quarter of a yard.

The Scolopendra is otherwiſe called the Centipes, from the number of its feet; and it is very common in many parts of the world, eſpecially between the tropics. Thoſe of the Eaſt Indies, where they grow to the largeſt ſize, are about ſix inches long, of a ruddy colour, and as thick as a man's finger: they conſiſt of many joints; and from each joint is a leg on each ſide: they are covered with hair, and ſeem to have no eyes; but there are two feelers on the head, which they make uſe of to find out the way they are to paſs: the head is very round, with two ſmall ſharp teeth, with which they inflict wounds that are very painful and dangerous. A ſailor that was bit by one on board a ſhip, felt an exceſſive pain, and his life was ſuppoſed to be in danger: however, he recovered, by the application of three roaſted onions to the part, and was ſoon quite well. Of this animal there are different kinds; ſome living, like worms, in holes in the earth; others under ſtones, and among rotten wood: ſo that nothing is more dangerous than removing thoſe ſubſtances, in the places where they breed.

The Gally-worm differs from the ſcolopendra, in having double the number of feet; there being two on each ſide, to every joint of the body. Some of theſe are ſmooth, and others hairy; ſome are yellow, ſome black, and ſome brown. They are found among decayed trees, between the wood and the bark; as alſo among ſtones that are covered with moſs. They all, when touched, contract themſelves, rolling themſelves up like a ball. Whatever may be their qualities in the tropical parts of the world, in Europe they are perfectly harmleſs; having been often handled and irritated, without any vindictive conſequences.

All theſe, as well as the ſcorpion, are ſuppoſed to be produced perfect from the parent, or the egg; and to undergo no changes, after their firſt excluſion. They are ſeen of all ſizes; and this is a ſufficient inducement to ſuppoſe, that they preſerve their firſt appearance, through the whole of their exiſtence. It is probable, however, that like moſt of this claſs, they often change their ſkins; but of this we have no certain information.

CHAP. XI.

OF THE LEECH.

THE laſt of this wingleſs tribe that I ſhall mention is the Leech, which, like all the former, undergoes no varieties of transformation; but when once excluded from the body of the parent, preſerves its firſt figure to the end. I place the hiſtory of the leech among the firſt claſs of inſects; while I have degraded the Earth-worm, the Tænia, and the Polypus, into the claſs of zoophytes, or that imperfect tribe which ſerves to make the ſhade between animal and vegetable Nature. Not but that the earth-worm or the polypus have their motions, their appetites, and their vital principles, as complete as the leech, and, to a curſory view, appear every way as complete animals. But there is one circumſtance that lays the line between them; that exalts the one and degrades the other. The earth-worm and the polypus may be cut in two pieces, and each piece will produce a new and perfect animal: the leech cannot ſuffer this diſſection, but dies when cut in two; an evident inſtance that it is poſſeſſed of a more perfect organization than thoſe animals which it otherwiſe very much reſembles.

The leech, from its uſes in medicine, is one of thoſe inſects that man has taken care to provide; but of a great variety, one kind only is conſidered as ſerviceable. The horſe-leech, which is the largeſt of all, and grows to four inches in length, with a gloſſy, black ſurface, is of no uſe, as it will not ſtick to the ſkin; the ſnail-leech is but an inch in length; and though it will ſtick, is not large enough to extract a ſufficient quantity of blood from the patient; the broad-tailed leech, which grows to an inch and a half in length, with the back raiſed into a ſort of a ridge, will ſtick but on very few occaſions: it is the large brown leech, with a whitiſh belly, that is made uſe of in medicine, and whoſe hiſtory beſt merits our curioſity.

The leech has the general figure of a worm, and is about as long as one's middle finger. Its ſkin is compoſed of rings, by means of which it is poſſeſſed of its agility, and ſwims in water. It contracts itſelf, when out of water, in ſuch a manner, that when touched it is not above an inch long.—It has a ſmall head, and a black ſkin, edged with a yellow line on each ſide, with ſome yellowiſh ſpots on the back. The belly alſo, which is of a reddiſh colour, is marked with whitiſh yellow ſpots. But the moſt remarkable part of this animal is the mouth, which is compoſed of two lips, that take whatever form the inſect finds convenient. When at reſt, the opening is uſually triangular; and within it are placed three very ſharp teeth, capable of piercing not only the human ſkin, but alſo that of a horſe or an ox. Still deeper in the head, is diſcovered the tongue, which is compoſed of a ſtrong fleſhy ſubſtance, and which ſerves to aſſiſt the animal in ſucking, when it has inflicted its triple wound; for no ſooner is this voracious creature applied to the ſkin, than it buries its teeth therein, then cloſes its lips round the wound which it has made; and thus, in the manner of a cupping-claſs, extracts the blood as it flows to the different orifices.

In examining this animal's form farther towards the tail, it is ſeen to have a gullet and an inteſtinal canal, into which the blood flows in great abundance. On each ſide of this are ſeen running along ſeveral little bladders, which, when the animal is empty, ſeem to be filled with nothing but water; but when it is gorging blood, they ſeem to communicate with the inteſtines, and receive a large portion of the blood which flows into the body. If theſe bladders ſhould be conſidered as ſo many ſtomachs, then every leech will be found to have twenty-four. But what is moſt extraordinary of all in this animal's formation is, that though it takes ſo large a quantity of food, it has no anus or paſſage to eject it from the body when it has been digeſted. On the contrary, the blood which the leech has thus ſucked remains for ſeveral months clotted within its body, blackened a little by the change, but no way putrified, and very little altered in its texture or conſiſtence. In what manner it paſſes through the animal's body, or how it contributes to its nouriſhment, is not eaſily accounted for. The water in which they are kept is very little diſcoloured by their continuance; they cannot be ſuppoſed to return the blood by the ſame paſſage through which it was taken in: it only remains, therefore, that it goes off through the pores of the body, and that theſe are ſufficiently large to permit its excluſion.

But it is not in this inſtance alone that the leech differs from all other inſects. It was remarked in a former chapter, that the whole inſect tribe had the opening into their lungs placed in their ſides, and that they breathed through thoſe apertures as other animals through the mouth. A drop of oil poured on the ſides of a waſp, a bee, or a worm, would quickly ſuffocate them, by ſtopping up the paſſages through which they breathe; but it is otherwiſe with the leech, for this animal may be immerſed in oil without injury; nay, it will live therein; and the only damage it will ſuſtain is, that, when taken out, it will be ſeen to caſt a fine pellucid ſkin exactly of the ſhape of the animal, after which it is as alert and vigorous as before. It appears from hence that the leech breathes through the mouth; and, in fact, it has a motion that ſeems to reſemble the act of reſpiration in more perfect animals: but concerning all this we are very much in the dark.

This animal ſeems to differ from all others in ſeveral reſpects: the reſt of the reptile tribe are brought forth from eggs; the leech is viviparous, and produces its young one after the other, to the number of forty or fifty at a birth. It is probable that, like the ſnail, each inſect contains the two ſexes, and that it impregnates and is impregnated in the ſame manner. The young ones are chiefly found in the month of July, in ſhallow running waters, and particularly where they are tepified by the rays of the ſun. The large ones are chiefly ſought after; and being put into a glaſs veſſel filled with water, they remain for months, nay for years, without taking any other ſubſiſtence. But they never breed in this confinement; and, conſequently, what regards that part of their hiſtory ſtill remains obſcure.

In this part of the world they ſeldom grow to above four inches; but in America and the Eaſt they are found from ſix to ſeven. Their pools there abound with them in ſuch numbers, that it would be dangerous bathing there, if for no other conſideration. Our ſailors and ſoldiers, who the laſt war were obliged to walk in thoſe countries through marſhy grounds, talk with terror of the number of leeches that infeſted them on their march. Even in ſome parts of Europe they increaſe ſo as to become formidable. Sedelius, a German phyſician, relates, that a girl of nine years old, who was keeping ſheep near the city of Bomſt in Poland, perceiving a ſoldier making up to her, went to hide herſelf in a neighbouring marſh among ſome buſhes; but the number of leeches was ſo great in that place, and they ſtuck to her ſo cloſe, that the poor creature expired from the quantity of blood which ſhe loſt by their united efforts. Nor is this much to be wondered at, ſince one of thoſe inſects that when empty generally weighs but a ſcruple, will, when gorged, weigh more than two drachms.

When leeches are to be applied, the beſt way is to take them from the water in which they are contained about an hour before, for they thus become more voracious and faſten more readily. When ſaturated with blood, they generally fall off of themſelves; but if it be thought neceſſary to take them from the wound, care ſhould be uſed to pull them very gently, or even to ſprinkle them with ſalt if they continue to adhere: for if they be plucked rudely away, it moſt frequently happens that they leave their teeth in the wound, which makes a very troubleſome inflammation, and is often attended with danger. If they be ſlow in fixing to the part, they are often enticed by rubbing it with milk or blood, or water mixed with ſugar. As ſalt is a poiſon to moſt inſects, many people throw it upon the leech when it has dropped from the wound, by which means it diſgorges the blood it has ſwallowed, and it is then kept for repeated application. They ſeldom, however, ſtick after this operation; and as the price is but ſmall, freſh leeches ſhould always be applied whenever ſuch an application is thought neceſſary.

BOOK II.

INSECTS OF THE SECOND ORDER.

CHAP. I.

OF THE SECOND ORDER OF INSECTS IN GENERAL.

IN the former part we gave a conciſe hiſtory of the moſt conſiderable inſects that, without wings, were produced in a perfect ſtate; either from the body of the parent alive, like quadrupeds, or from the egg, in the manner of birds. We come now to a ſecond order of inſects, that are produced from the egg, like the former, but not in a perfect ſtate; for when firſt excluded, they are without wings.—This however, does not hinder the exerciſe of their animal functions; the inſect, although not yet come to perfection, walks, leaps, and eats; nor is it ever deprived of motion, only that it reſts a little when it is about to caſt that part of its ſkin previous to its ſtate of perfection. It is then ſeen to aſſume two wings, which, like a budding flower, burſt through the caſe that contained them, and the animal becomes a winged inſect in its ſtate of higheſt perfection. To this order we may refer the Libella, or Dragon-Fly; the Formica Leo, or Lion-Ant; the Graſshopper; the Locuſt; the Cricket; the Wood-Cricket; the Mole-Cricket; the Flea-Locuſt; the Flying-Bug; the Tipula; the Water-Scorpion; the Notonecta, or Water-Fly, and many others.

CHAP. II.

OF THE LIBELLA, OR DRAGON FLY.

OF all the flies which adorn or diverſify the face of Nature, theſe are the moſt various and the moſt beautiful; they are of all colours; green, blue, crimſon, ſcarlet, white; ſome unite a variety of the moſt vivid tints, and exhibit in one animal more different ſhades than are to be found in the rainbow. They are called, in different parts of the kingdom, by different names; but none can be at a loſs to know them, as they are diſtinguiſhed from all other flies by the length of their bodies, by the largeneſs of their eyes, and the beautiful tranſparency of their wings, which are four in number. They are ſeen in ſummer flying with great rapidity near every hedge, and by every running brook; they ſometimes ſettle on the leaves of plants, and ſometimes keep for hours together on the wing.

Dragon-flies, though there are three or four different kinds, yet agree in the moſt ſtriking parts of their hiſtory, and one account may ſerve for all. The largeſt ſort are generally found from two to three inches long; their tail is forked; the body divided into eleven rings; their eyes are large, horny, and tranſparent, divided by a number of interſections; and their wings, that always lie flat when they are at reſt, are of a beautiful gloſſy tranſparency: ſometimes ſhining like ſilver, and ſometimes gliſtening like gold. Within the mouth are to be ſeen two teeth covered with a beautiful lip: with theſe the creatures bite fiercely when they are taken; but their bite is perfectly harmleſs, as I have experienced more than once.

Theſe inſects, beautiful as they are, are produced from eggs, which are depoſited in the water, where they remain for ſome time without ſeeming life or motion. They are ejected by the female into the water in cluſters, like a bunch of grapes, where they ſink to the bottom by their natural weight, and continue in that ſtate till the young ones find ſtrength enough to break the ſhell, and to ſeparate from each other. The form in which they firſt ſhow life, is that of a worm with ſix legs, bearing a ſtrong reſemblance to the dragon-fly in its winged ſtate, except that the wings are yet concealed within a ſheath peculiar to this animal. The rudiments of theſe appear in bunches on the back; within which the wings are folded up into each other, while all the colours and varieties of painting appear tranſparent through the ſkin. Theſe animals, upon quitting the egg, ſtill continue in the water, where they creep and ſwim, but do not move ſwiftly. They have likewiſe a ſharp ſight, and immediately ſink to the bottom, if any one comes to the places wherein they live, or whenever they perceive the leaſt uncommon object. Their food at that time is ſoft mud and the glutinous earthy ſubſtances that are found at the bottom.

When theſe animals prepare to change from their reptile to their flying ſtate, they then move out of the water to a dry place; as into graſs; to pieces of wood, ſtone, or any thing elſe they meet with. They there firmly fix their acute claws; and, for a ſhort time, continue quite immoveable, as if meditating on the change they are to undergo. It is then obſerved, that the ſkin firſt opens on the head and back; and out of this opening they exhibit their real head and eyes, and at length their ſix legs; whilſt, in the mean time, the hollow and empty ſkin, or ſlough of their legs, remains firmly fixed in its place. After this, the encloſed creature creeps forward by degrees; and by this means draws firſt its wings and then its body out of the ſkin; and proceeding a little farther, ſits at reſt for ſome time, as if immoveable. During this time, the wings, which were moiſt and folded, begin by degrees to expand themſelves, and to make ſmooth and even all thoſe plaits which were laid againſt each other, like a cloſed fan. The body is likewiſe inſenſibly extended, until all the limbs have obtained their proper ſize and dimenſions. All theſe ſurpriſing and difficult operations are accompliſhed by the force of the blood and the circulating humours. The creature cannot at firſt make uſe of its new wings, and therefore is forced to ſtay in the ſame place until all its limbs are dried by the circumambient air. It ſoon, however, begins to enter upon a more noble life than it had hitherto led in the bottom of the brook; and from creeping ſlowly and living accidentally, it now wings the air, and makes choice from amidſt the variety of its proviſions.

Indeed, no animal is more amply fitted for motion, ſubſiſtence, and enjoyment. As it haunts and ſeeks after its food flying in the air, Nature has provided it with two large eyes, which make almoſt the whole head, and which reſemble glittering mother-of-pearl. It has alſo four expanſive ſilver-coloured wings, with which, as with oars, it can turn itſelf with prodigious velocity; and to aſſiſt theſe, it is furniſhed with a very long body, which, like a rudder, directs its motions. As the wings are long, and the legs ſhort, they ſeldom walk, but are ever ſeen either reſting or flying. For this reaſon, they always chooſe dry branches of trees or ſhrubs to remain on; and when they have refreſhed themſelves a little, they renew their flight. Thus they are ſeen adorning the ſummer with a profuſion of beauty, lightly traverſing the air in a thouſand directions, and expanding the moſt beautiful colours to the ſun. The garden, the foreſt, the hedges, and the rivulets, are animated by their ſports; and there are few who have been brought up in the country who have not employed a part of their childhood in the purſuit.

But while theſe beautiful flies appear to us ſo idly and innocently employed, they are in fact the greateſt tyrants of the inſect tribe; and, like the hawk among birds, are only hovering up and down to ſeize their prey. They are the ſtrongeſt and the moſt courageous of all winged inſects; nor is there one, how large ſoever, that they will not attack and devour. The blue-fly, the bee, the waſp, and the hornet, make their conſtant prey; and even the butterfly, that ſpreads ſo large a wing, is often caught and treated without mercy. Their appetite ſeems to know no bounds; they ſpend the whole day in the purſuit, and have been ſeen to devour three times their own ſize in the capture of a ſingle hour. They ſeize their prey flying with their ſix claws, and tear it eaſily to pieces with their teeth, which are capable of inflicting troubleſome wounds.

But the males are upon the wing for another purpoſe beſide that of food, as they are very ſalacious, and ſeek the females with great ardour. The ſun no ſooner begins to warm the fields, than the males are found aſſiduouſly employed each in ſeeking its mate; and no ſooner does a female appear, but two or three males are ſeen purſuing and endeavouring to ſeize her with all their arts and agility. The inſtrument of generation in the male is placed very different from that of any other inſect, being not at the end of the tail as in others, but immediately under the breaſt, and conſequently, at firſt view, incapable of being united to the ſexual part of the female; which, as in other inſects, lies in the tail. To perform this junction, Nature has provided the male with a very peculiar manner of proceeding. As ſoon as he perceives the female, and finds himſelf ſufficiently near, he ſeizes upon the back of her head by ſurpriſe, and faſtening his claws upon her, turns round his forky tail, which he faſtens round her neck, and in this manner fixes himſelf ſo cloſely and firmly, that no efforts can remove him. It is in vain that ſhe flies from one branch to another and ſettles upon them, he ſtill keeps fixed, and often continues in this ſituation for three or four hours ſucceſſively. When he flies, ſhe is obliged to fly with him; but he ſtill directs the way: and though ſhe moves her wings, ſhe ſeems entirely guided by his motions. As yet, however, the buſineſs of impregnation is not performed; for to this the female muſt contribute; and ſhe at laſt ſeems, by the continuance of her conſtraint to comply: for, turning up the end of her tail to that part of the breaſt of the male in which lies the part proper for generation, both inſtruments meet, and the eggs of the female receive the neceſſary fecundation. An hour or two after this, ſhe flies to ſome neighbouring pool, where ſhe depoſits her eggs, as was already mentioned. There they continue in a reptile ſtate for a year; and then are changed into a beautiful fly, reſembling the parent.

CHAP. III.

OF THE FORMICA LEO, OR LION-ANT.

ALTHOUGH this animal properly belongs to no order of inſects, yet as it is changed into a fly very much reſembling that deſcribed in the preceding chaper, it may not be improper to give its hiſtory here. If we conſider the life of this animal, in its different ſtages of exiſtence, we ſhall find it equally wonderful in all; but as it changes to a dragon-fly, what we have ſaid of that animal above, need not be repeated here. The lion-ant, when it becomes an inhabitant of air, in every reſpect reſembles that which has been already deſcribed; its gloſſy wings, its voracious appetites, its peculiar manner of generation, are entirely the ſame. It is in its reptile ſtate that it differs from all other inſects; and in that ſtate it will be amuſing to purſue its hiſtory.

The lion-ant, in its reptile ſtate, is of the ſize of a common wood-louſe, but ſomewhat broader. It has a pretty long head and a roundiſh body, which becomes a little narrower towards the tail. The colour is a dirty grey, ſpeckled with black, and the body is compoſed of ſeveral flat rings, which ſlip one upon another. It has ſix feet, four of which are fixed to the breaſt and two to the neck. The head is ſmall and flat, and before there are two little ſmooth horns or feelers, which are hard, about a quarter of an inch long, and crooked at the ends. At the baſis of the feelers there are two ſmall black, lively eyes, by which it can ſee the ſmalleſt object, as is eaſily diſcovered by its ſtarting from every thing that approaches.

To a form ſo unpromiſing, and ſo ill provided for the purpoſes of rapacity, this animal unites the moſt ravenous appetites in Nature; but to mark its imbecility ſtill ſtronger, as other animals have wings or feet to enable them to advance towards their prey, the lion-ant is unprovided with ſuch aſſiſtance from either. It has legs, indeed; but theſe only enable it to run backward, ſo that it could as ſoon die as make the ſmalleſt progreſſive motion. Thus, famiſhed and rapacious as it ever ſeems, its prey muſt come to it, or rather into the ſnare provided for it, or the inſidious aſſaſſin muſt ſtarve.

But Nature, that has denied it ſtrength or ſwiftneſs, has given it an equivalent in cunning, ſo that no animal fares more ſumptuouſly, without ever ſtirring from its retreat. For this purpoſe, it chooſes a dry, ſandy place, at the foot of a wall, or under ſome ſhelter, in order to preſerve its machinations from the rain. The drieſt and moſt ſandy ſpot is the moſt proper for it; becauſe a heavy, clogged earth would defeat its labour. When it goes about to dig the hole where it takes its prey, it begins to bend the hinder part of its body, which is pointed, and thus works backward; making, after ſeveral attempts, a circular furrow, which ſerves to mark out the ſize of the hole it intends making, as the ancients marked out the limits of a city with the plough. Within this firſt furrow it digs a ſecond, then a third, and afterwards others, which are always leſs than the preceding. Then it begins to deepen its hole, ſinking lower and lower into the ſand, which it throws with its horns or feelers towards the edges, as we ſee men throw up ſand in a gravel-pit. Thus, by repeating its labours all round, the ſand is thrown up in a circle about the edge of the pit, until the whole is quite completed. This hole is always formed in a perfect circle; and the pit itſelf reſembles the inſide of an inverted funnel. When this inſect firſt leaves the egg and is newly hatched, the firſt pit it makes is very ſmall; but as it grows bigger, it makes a larger hole; which is deſtined, like a pit-fall, to entrap its prey. It is generally about two inches deep, and as much in diameter.

The work being thus, with great labour, finiſhed, the inſidious inſect places itſelf in ambuſh, hiding itſelf at the bottom, under the ſand, in ſuch a manner, that its two horns encircle the bottom of the pit. All the ſides of this pit-fall are made of the moſt looſe and crumbling materials; ſo that ſcarce any inſect can climb up that has once got down to the bottom. Conſcious of this, the lion-ant remains in patient expectation, ready to profit by that accident which throws ſome heedleſs little animal into its den. If then, by misfortune, an ant, a wood-louſe, or a ſmall caterpillar walks too near the edge of the precipice, the ſand gives way beneath them, and they fall to the bottom of the pit, where they meet inevitable deſtruction. The fall of a ſingle grain of ſand gives the murderer notice at the bottom of its cave; and it never fails to ſally forth to ſeize upon its prey. It happens ſometimes, however, that the ant or the wood-louſe is too nimble, and runs up the ſides of the pit-fall before the other can make ready to ſeize it. The lion-ant has then another contrivance, ſtill more wonderful than the former; for, by means of its broad head and feelers, it has a method of throwing up a ſhower of ſand which falls upon the ſtruggling captive with tremendous weight, and once more cruſhes it down to the bottom. When the inſect is once fallen thus low, no efforts can retrieve or releaſe it; the lion-ant ſeizes it with its feelers, which are hollow, and darting them both into its body, ſucks out all the little animal's juices with the utmoſt rapacity.

When the prey is thus reduced to a huſk, and nothing but the external form remains, the next care of the murderer is to remove the body from its cell; ſince the appearance of dead carcaſſes might forewarn other inſects of the danger of the place. The inſect, therefore, takes up the waſted trunk with its feelers, and throws it, with wonderful ſtrength, at leaſt ſix inches from the edge of its hole; and then patiently ſets about mending the breaches which its fortifications had received in the laſt engagement. Nothing can abate its induſtry, its vigilance, its patience, or its rapacity. It will work for a week together to make its pit-fall; it will continue upon the watch for more than a month, patiently expecting the approach of its prey; and if it comes in greater quantities than is needful, yet ſtill the little voracious creature will quit the inſect it has newly killed, and leave it half-eaten, to kill and attack any other that happens to fall within the ſphere of its malignity: though ſo voracious, it is ſurpriſingly patient of hunger; ſome of them having been kept in a box with ſand, for ſix months and upwards, without feeding at all.

When the lion-ant attains a certain age, in which it is to change into another form, it then leaves off its uſual rapacious habits, but keeps on its induſtry. It no longer continues to make pits, but furrows up the ſand all round in an irregular manner; teſtifying thoſe workings and violent agitations which moſt inſects exhibit previous to their transformation. Theſe animals are produced in autumn, and generally live a year, and perhaps two, before they aſſume a winged form. Certain it is, that they are found at the end of winter of all ſizes; and it would ſeem that many of the ſmaller kinds had not yet attained ſufficient maturity for transformation. Be this as it may, when the time of change approaches, if the inſect finds its little cell convenient, it ſeeks no other: if it is obliged to remove, after furrowing up the ſand, it hides itſelf under it, horns and all. It there ſpins a thread, in the manner of the ſpider; which being made of a glutinous ſubſtance, and being humid from the moiſture of its body, ſticks to the little particles of ſand among which it is ſpun; and in proportion as it is thus excluded, the inſect rolls up its web, ſand and all, into a ball, of which itſelf is the centre. This ball is about half an inch in diameter; and within it the inſect reſides, in an apartment ſufficiently ſpacious for all its motions. The outſide is compoſed of ſand and ſilk; the inſide is lined with ſilk only, of a fine pearl-colour, extremely delicate, and perfectly beautiful. But though the work is ſo curious within, it exhibits nothing to external appearance, but a lump of ſand; and thus eſcapes the ſearch of birds that might otherwiſe diſturb the inhabitant within.

The inſect continues thus ſhut up for ſix weeks or two months; and gradually parts with its eyes, its feelers, its feet, and its ſkin; all which are thruſt into a corner of the inner apartment, like a rag. The inſect then appears almoſt in its winged ſtate, except that there is a thin ſkin which wraps up the wings, and that appears to be nothing elſe but a liquor dried on their outſide. Still, however, the little animal is too delicate and tender to venture from its retreat; but continues incloſed for ſome time longer: at length, when the members of this new inſect have acquired the neceſſary conſiſtence and vigour, it tears open its lodging, and breaks through its wall. For this purpoſe it has two teeth, like thoſe of graſshoppers, with which it eats through, and enlarges the opening, till it gets out. Its body, which is turned like a ſcrew, takes up no more than the ſpace of a quarter of an inch; but when it is unfolded, it becomes half an inch in length; while its wings, that ſeemed to occupy the ſmalleſt ſpace, in two minutes time unfold, and become longer than the body. In ſhort, it becomes a large and beautiful fly, of the libellula kind, with a long, ſlender body, of a brown colour; a ſmall head, with large, bright eyes, long, ſlender legs, and four large, tranſparent, reticulated wings. The reſt of its habits reſemble that inſect whoſe form it bears; except, that inſtead of dropping its eggs in the water, it depoſits them in ſand, where they are ſoon hatched into that rapacious inſect ſo juſtly admired for its method of catching its prey.

CHAP. IV.

OF THE GRASSHOPPER, THE LOCUST, THE CICADA, THE CRICKET, AND THE MOLE-CRICKET.

BELONGING to the ſecond order of inſects, we find a tribe of little animals, which, though differing in ſize and colour, ſtrongly reſemble each other in figure, appetites, nature, and transformation. But though they all appear of one family, yet man has been taught to hold them in different eſtimation; for while ſome of this tribe amuſe him with their chirpings, and baniſh ſolitude from the fields, others come in ſwarms, eat up every thing that is green, and in a ſingle night convert the moſt delightful landſcape into a dreary waſte. However, if theſe animals be ſeparately conſidered, the devouring locuſt is not in the leaſt more miſchievous than the muſical graſshopper; the only difference is, that one ſpecies comes for food in a ſwarm, the other feeds ſingly.

That animal which is called the graſshopper with us, differs greatly from the cicada of antiquity; for as our inſect is active enough in hopping through the long graſs, from whence it has taken its name, the cicada had not this power, but either walked or flew. The little hiſſing note, alſo, of our graſshopper is very different from the ſong of the cicada, which was louder and far more muſical. The manner in which this note is produced by the two animals is very different; for the cicada makes it by a kind of buckler, which the male has beneath its belly; the graſshopper by a tranſparent membrane that covers a hole at the baſe of its wings. There is a ſtill greater variety in all theſe with regard to ſhape and colour. Some are green, ſome black, ſome livid, and ſome variegated; but many of them do not ſhow all their colours till they fly. Some have long legs, ſome ſhort, ſome with more joints, others with fewer. Some ſing, others are mute; ſome are innocent, doing no damage to the huſbandman; while others do ſuch prodigious miſchief, that they are looked upon in ſome countries as one of the terrible ſcourges of the incenſed Divinity.

Of this variegated tribe, the little graſshopper that breeds in ſuch plenty in every meadow, and that continues its chirping through the ſummer, is beſt known to us; and by having its hiſtory we ſhall be poſſeſſed of that of all the reſt. This animal is of the colour of green leaves, except a line of brown which ſtreaks the back, and two pale lines under the belly and behind the legs. It may be divided into the head, the corſlet, and the belly. The head is oblong, regarding the earth, and bearing ſome reſemblance to that of a horſe. Its mouth is covered by a kind of round buckler jutting over it, and armed with teeth of a brown colour, hooked at the points. Within the mouth is perceivable a large, reddiſh tongue, and fixed to the lower jaw. The feelers or horns are very long, tapering off to a point; and the eyes are like two black ſpecks, a little prominent. The corſlet, is elevated, narrow, armed above and below, by two ſerrated ſpines. The back is armed with a ſtrong buckler, to which the muſcles of the legs are firmly bound, and round theſe muſcles are ſeen the veſſels by which the animal breathes, as white as ſnow. The laſt pair of legs are much longer and ſtronger than the firſt two pair, fortified by thick muſcles, and very well formed for leaping. It has four wings; the anterior ones ſpringing from the ſecond pair of legs, the poſterior from the third pair. The hinder wings are much finer and more expanſive than the foremoſt, and are the principal inſtruments of its flight. The belly is conſiderably large, compoſed of eight rings, and terminated by a forky tail, covered with down, like the tail of a rat. When examined internally, beſides the gullet, we diſcover a ſmall ſtomach; and behind that a very large one, wrinkled and furrowed within ſide: lower down there is ſtill a third; ſo that it is not without reaſon that all the animals of this order are ſaid to chew the cud, as they ſo much reſemble ruminating animals in their internal conformation.

A ſhort time after the graſshopper aſſumes its wings, it fills the meadow with its note; which, like that among birds, is a call to courtſhip. The male only of this tribe is vocal; and, upon examining at the baſe of the wings, there will be found a little hole in its body, covered with a fine, tranſparent membrane. This is thought, by Linnæus, to be the inſtrument it employs in ſinging: but others are of opinion the ſound is produced by rubbing its hinder legs againſt each other: however this be, the note of one male is ſeldom heard, but it is returned by another; and the two little animals, after many mutual inſults of this kind, are ſeen to meet and fight deſperately. The female is generally the reward of victory; for, after the combat, the male ſeizes her with his teeth behind the neck, and thus keeps her for ſeveral hours till the buſineſs of fecundation is performed. They are at that time ſo ſtrongly united, that they can ſcarcely be ſeparated without tearing aſunder. Towards the latter end of autumn the female prepares to depoſit her burthen; and her body is then ſeen greatly diſtended with her eggs, which ſhe carries to the number of one hundred and fifty. In order to make a proper lodgement in the earth for them, Nature has furniſhed her with an inſtrument at her tail, ſomewhat reſembling a two-edged ſword, which ſhe can ſheathe and unſheathe at pleaſure: with this ſhe pierces the earth as deep as ſhe is able; and into the hole which her inſtrument has made, ſhe depoſits her eggs, one after the other.

Having thus provided for the continnation of her poſterity, the animal herſelf does not long ſurvive; but as the winter approaches, ſhe dries up, ſeems to feel the effects of age, and dies from a total decay. Some, however, aſſert, that ſhe is killed by the cold; and others, that ſhe is eaten by worms: but certain it is, that neither the male nor female are ever ſeen to ſurvive the winter. In the mean time the eggs which have been depoſited, continue unaltered, either by the ſeverity of the ſeaſon, or the retardation of the ſpring. They are of an oval figure, white, and of the conſiſtence of horn: their ſize nearly equals that of a grain of aniſe; they are enveloped in the body within a covering, branched all over with veins and arteries; and when excluded, they crack, on being preſſed between the fingers; their ſubſtance within is a whitiſh, viſcous, and tranſparent fluid. In this manner they remain depoſited beneath the ſurface of the earth, during the whole winter; till the genial return of ſpring begins to vivify and hatch them. The ſun, with its warmth, beginning to animate all Nature, the inſect eggs feel its benign influence; and, generally, about the beginning of May, every egg produces an inſect, about the ſize of a flea. Theſe, at firſt, are of a whitiſh colour; at the end of two or three days they turn black; and ſoon after they become of a reddiſh brown. They appear, from the beginning, like graſshoppers wanting wings; and hop among the graſs as ſoon as excluded, with great agility.

Yet ſtill they are by no means arrived at their ſtate of full perfection; although they bear a ſtrong reſemblance to the animal in its perfect form. They want, or ſeem to want, the wings, which they are at laſt ſeen to aſſume; and can only hop among the graſs, without being able to fly. The wings, however, are not wanting, but are concealed within four little bunches, that ſeem to deform the ſides of the animal: there they lie rolled up in a moſt curious manner; and occupying a ſmaller ſpace than one would conceive who ſaw them extended. Indeed, all inſects, whatever tranſmutations they ſeem to undergo, are yet brought forth with thoſe very limbs, parts, and wings, which they afterwards ſeem to acquire. In the moſt helpleſs caterpillar, there is ſtill to be ſeen the rudiments of that beautiful plumage which it afterwards expands when a butterfly: and though many new parts ſeem unfolded to the view, the animal acquires none but ſuch as it was from the beginning poſſeſſed of. The graſshopper, therefore, though ſeemingly without wings, is is, in reality, from the firſt, poſſeſſed of thoſe inſtruments, and only waits for ſufficient force to break the bonds that hold them folded up, and to give them their full expanſion.

The graſshopper, that for above twenty days, from its excluſion has continued without the uſe of its wings, which are folded up to its body, at length prepares for its emancipation, and for a life of greater liberty and pleaſure. To make the proper diſpoſitions for the approaching change, it ceaſes from its graſſy food, and ſeeks about for a convenient place; beneath ſome thorn or thiſtle, that may protect it from an accidental ſhower. The ſame laborious writhings and workings, heavings and palpitations, which we have remarked in every other inſect upon an approaching change, are exhibited in this. It ſwells up its head and neck; it then ſeems to draw them in again; and thus alternately, for ſome time, it exerts its powers to get free. At length, the ſkin covering the head and breaſt is ſeen dividing above the neck; the head is ſeen iſſuing out firſt from the burſting ſkin; the efforts ſtill continuing, the other parts follow ſucceſſively; ſo that the little animal, with its long feelers, legs and all, works its way from the old ſkin, that remains fixed to the thiſtle or the thorn. It is, indeed, inconceivable how the inſect can thus extricate itſelf from ſo exact a ſheath as that which covered every part of its body.

The graſshopper, thus diſengaged from its outer ſkin, appears in its perfect form; but then ſo feeble, and its body ſo ſoft and tender, that it may be molded like wax. It is no longer of that obſcure colour which it exhibited before, but a greeniſh white, which becomes more vivid as the moiſture on the ſurface is dried away. Still, however, the animal continues to ſhew no ſigns of life, but appears quite ſpent and fatigued with its labour for more than a hour together. During this time, the body is drying, and the wings unfolding to their greateſt expanſion, and the curious obſerver will perceive them, fold after fold, opening to the ſun, till at laſt they become longer than the two hinder legs. The inſect's body alſo is lengthened during this operation, and it becomes much more beautiful than before.

Theſe inſects are generally vocal in the midſt of ſummer, and they are heard at ſun-ſetting much louder than during the heats of the day. They are fed upon graſs; and, if their belly be preſſed, they will be ſeen to return the juices of the plants they have laſt fed upon. Though unwilling to fly, and ſlow in flight, particularly when the weather is moiſt or cool, they are ſometimes ſeen to fly to conſiderable diſtances. If they are caught by one of the hinder legs, they quickly diſengage themſelves from it, and leave the leg behind them. This, however, does not grow again, as with crabs or ſpiders; for as they are animals but of a ſingle year's continuance, they have not ſufficient time for repairing thoſe accidental misfortunes. The loſs of their leg alſo prevents them from flying; for being unable to lift themſelves in the air, they have not room upon the ground for the proper expanſion of their wings. If they be handled roughly, they will bite very fiercely; and when they fly, they make a noiſe with their wings. They generally keep in the plain, where the graſs is luxuriant and the ground rich and fertile: there they depoſit their eggs, particularly in thoſe cracks which are formed by the heat of the ſun.

Such are the habits and nature of thoſe little vocal inſects, that ſwarm in our meadows, and enliven the landſcape. The larger kinds only differ from them in ſize, in rapidity of flight, and the powers of injuring mankind, by ſwarming upon the productions of the earth. The quantity of graſs which a few graſshoppers that ſport in the fields can deſtroy is trifling; but when a ſwarm of locuſts, two or three miles long, and ſeveral yards deep, ſettle upon a field, the conſequences are frightful. The annals of every country are marked with the devaſtation which ſuch a multitude of inſects produces; and though they ſeldom viſit Europe in ſuch dangerous ſwarms as formerly, yet, in ſome of the ſouthern kingdoms, they are ſtill formidable. Thoſe which have at uncertain intervals viſited Europe, in our memory, are ſuppoſed to have come from Africa, and the animal is called the great Brown Locuſt. It was ſeen in ſeveral parts of England in the year 1748, and many dreadful conſequences were apprehended from its appearance. This inſect is about three inches long; and has two horns or feelers, an inch in length. The head and horns are of a browniſh colour; it is blue about the mouth, as alſo on the inſide of the larger legs. The ſhield that covers the back is greeniſh; and the upper ſide of the body brown, ſpotted with black, and the under ſide purple. The upper wings are brown, with ſmall duſky ſpots, with one larger at the tips; the under wings are more tranſparent, and of a light brown, tinctured with green, but there is a dark cloud of ſpots near the tips. This is that inſect that has threatened us ſo often with its viſitations; and that is ſo truly terrible in the countries where it is bred. There is no animal in the creation that multiplies ſo faſt as theſe, if the ſun be warm, and the ſoil in which their eggs are depoſited be dry. Happily for us, the coldneſs of our climate, and the humidity of our ſoil, are no way favourable to their production; and as they are but the animals of a year, they viſit us and periſh.

The Scripture, which was written in a country where the locuſt made a diſtinguiſhed feature in the picture of Nature, has given us ſeveral very ſtriking images of this animal's numbers and rapacity. It compares an army, where the numbers are almoſt infinite, to a ſwarm of locuſts: it deſcribes them as riſing out of the earth, where they are produced; as purſuing a ſettled march to deſtroy the fruits of the earth, and co-operate with Divine Indignation.

When the locuſts take the field, as we are aſſured, they have a leader at their head, whoſe flight they obſerve, and pay a ſtrict attention to all his motions. They appear, at a diſtance, like a black cloud, which, as it approaches, gathers upon the horizon, and almoſt hides the light of the day. It often happens that the huſbandman ſees this imminent calamity paſs away without doing him any miſchief; and the whole ſwarm proceed onward, to ſettle upon the labours of ſome leſs fortunate country. But wretched is the diſtrict upon which they ſettle: they ravage the meadow and the paſture ground; ſtrip the trees of their leaves, and the garden of its beauty: the viſitation of a few minutes deſtroys the expectation of a year; and a famine but too frequently enſues. In their native tropical climates they are not ſo dreadful as in the more ſouthern parts of Europe. There, though the plain and the foreſt be ſtripped of their verdure, the power of vegetation is ſo great, that an interval of three or four days repairs the calamity: but our verdure is the livery of a ſeaſon; and we muſt wait till the enſuing ſpring repairs the damage. Beſides, in their long flights to this part of the world, they are famiſhed by the tedioufneſs of their journey, and are therefore more voracious wherever they happen to ſettle. But it is not by what they devour that they do ſo much damage as by what they deſtroy. Their very bite is thought to contaminate the plant, and to prevent its vegetation. To uſe the expreſſion of the huſbandman, they burn whatever they touch; and leave the marks of their devaſtation for two or three years enſuing. But if they be noxious while living, they are ſtill more ſo when dead; for wherever they fall, they infect the air in ſuch a manner, that the ſmell is inſupportable. Oroſius tells us, that in the year of the world 3800, there was an incredible number of locuſts which infected Africa; and, after having eaten up every thing that was green, they flew off and were drowned in the African ſea; where they cauſed ſuch a ſtench, that the putrefying bodies of hundreds of thouſands of men could not equal it.

In the year 1690, a cloud of locuſts was ſeen to enter Ruſſia in three different places; and from thence to ſpread themſelves over Poland and Lithuania, in ſuch aſtoniſhing multitudes, that the air was darkened, and the earth covered with their numbers. In ſome places they were ſeen lying dead, heaped upon each other four feet deep; in others, they covered the ſurface like a black cloth: the trees bent beneath their weight; and the damage which the country ſuſtained exceeded computation. In Barbary their numbers are formidable and their viſits are frequent. In the year 1724, Dr. Shaw was a witneſs in that country of their devaſtations. Their firſt appearance was about the latter end of March, when the wind had been ſoutherly for ſome time. In the beginning of April, their numbers were ſo vaſtly increaſed, that in the heat of the day they formed themſelves into large ſwarms, which appeared like clouds, and darkened the ſun. In the middle of May they began to diſappear, retiring into the plains to depoſit their eggs. In the next month, being June, the young brood began to make their appearance, forming many compact bodies of ſeveral hundred yards ſquare; which afterwards marching forward, climbed the trees, walls, and houſes, eating every thing that was green in their way. The inhabitants, to ſtop their progreſs, laid trenches all over their fields and gardens, filling them with water. Some placed large quantities of heath, ſtubble, and ſuch like combuſtible matter, in rows, and ſet them on fire on the approach of the locuſts. But all this was to no purpoſe; for the trenches were quickly filled up, and the fires put out by the vaſt number of ſwarms that ſucceeded each other. A day or two after one of theſe was in motion, others that were juſt hatched came to glean after them, gnawing off the young branches and the very bark of the trees. Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like ſtate, by caſting their ſkins. To prepare themſelves for this change, they fixed their hinder feet to ſome buſh or twig, or corner of a ſtone, when immediately, by an undulating motion uſed on this occaſion, their heads would firſt appear, and ſoon after the reſt of their bodies. The whole transformation was performed in ſeven or eight minutes time; after which, they were a little while in a languiſhing condition; but as ſoon as the ſun and air had hardened their wings, and dried up the moiſture that remained after caſting off their ſloughs, they returned again to their former greedineſs, with an addition both of ſtrength and agility. But they did not continue long in this ſtate before they were entirely diſperſed; after laying their eggs directing their courſe northward, and probably periſhed in the ſea. It is ſaid that the holes theſe animals make, to depoſit their eggs in, are four feet deep in the ground; the eggs are about fourſcore in number, of the ſize of caraway comfits, and bundled up together in cluſters.

It would be endleſs to recount all the miſchiefs which theſe famiſhed inſects have at different times occaſioned; but what can have induced them to take ſuch diſtant flights, when they come into Europe, is not ſo eaſy to be accounted for. It ſeems moſt probable, that by means of a very dry ſeaſon in the heart of Africa, they are propagated in ſuch numbers, that the vegetables of the ſpot where they are produced are not ſufficient to ſuſtain them. Thus being obliged to find out other countries, they traverſe the ſandy deſerts, where they can find no ſuſtenance; ſtill meeting with nothing to allure them from their height, they proceed forward acroſs the ſea, and thus come into Europe, where they alight upon the firſt green paſtures that occur.

In ſome parts of the world, the inhabitants turn what ſeems a plague to their own advantage. Locuſts are eaten by the natives in many kingdoms of the eaſt; and are caught in ſmall nets provided for that purpoſe. They parch them over the fire in an earthen pan; and when their wings and legs are fallen off, they turn reddiſh, of the colour of boiled ſhrimps. Dampier has eat them thus prepared, and thinks them a tolerable diſh. The natives of Barbary alſo eat them fried with ſalt; and they are ſaid to taſte like cray-fiſh.

There is a locuſt in Tonquin, about the bigneſs of the top of a man's finger, and as long as the firſt joint. It breeds in the earth, in low grounds; and in the months of January and February, which is the ſeaſon for taking them, they iſſue from the earth in vaſt ſwarms. At firſt they can hardly fly, ſo that they often fall into the rivers in great numbers: however, the natives in theſe months watch the rivers, and take them up in multitudes in ſmall nets. They either eat them freſh, broiled on the coals, or pickle them for keeping. They are conſidered as a great delicacy in that part of the world, as well by the rich as the poor. In the countries where they are eaten, they are regularly brought to market, and ſold as larks or quails in Europe. They muſt have been a common food with the Jews, as Moſes, in the book of Leviticus, permits them to eat four different kinds of this animal, which he takes care to ſpecify. This diſh, however, has not yet made its way into the kitchens of the luxurious in Europe; and though we may admire the delicacies of the Eaſt, we are as yet happily deprived of the powers of imitation.

Of all animals, however, of this noxious tribe, the Great Weſt-Indian Locuſt, individually conſidered, is the moſt formidable. It is about the thickneſs of the barrel of a gooſe-quill, and the body is divided into nine or ten joints, in the whole about ſix or ſeven inches long. It has two ſmall eyes, ſtanding out of the head like thoſe of crabs, and two feelers like long hair. The whole body is ſtudded with ſmall excreſcences, which are not much bigger than the points of pins. The ſhape is roundiſh, and the body diminiſhes in circumference to the tail, which is forked into two horns. Between theſe, there is a ſort of a ſheath containing a ſmall dangerous ſting. If any perſon happens to touch this inſect, he is ſure to be ſtung; and is immediately taken with a ſhivering and trembling all over the body; which, however, may ſoon be put to a ſtop to, by rubbing the place that was affected with a little palm oil.

From the locuſt we deſcend to the cricket, which is a very inoffenſive and pretty animal. Though there be a ſpecies of this inſect that lives entirely in the woods and fields, yet that with which we are beſt acquainted is the Houſe-cricket, whoſe voice is ſo well known behind a country fire in a winter's evening. There is ſomething ſo unuſual in hearing a ſound while we do not ſee the animal producing it, nor diſcover the place from whence it comes, that among the country people the chirping of the cricket is always held ominous; and whether it deſerts the fire-ſide, or pays an unexpected viſit, the credulous peaſantry always find ſomething to be afraid of. In general, however, the killing of a cricket is conſidered as a moſt unlucky omen: and though their company is not much deſired, yet no methods muſt be taken to remove them.

The cricket very much reſembles the graſshopper in its ſhape, its manner of ruminating its voice, its leaping, and methods of propagation. It differs in its colour, which is uniformly of a ruſty brown; in its food, which is more various; and in its place of reſidence, which is moſt uſually in the warmeſt chinks behind a country hearth. They are, in ſome meaſure, obliged to the bad maſonry employed in making peaſants houſes for their retreats. The ſmalleſt chink ſerves to give them ſhelter; and where they once make their abode they are ſure to propagate. They are of a moſt chilly nature, ſeldom leaving the fire ſide; and, if undiſturbed, are ſeen to hop from their retreats to chirrup at the blaze in the chimney. The wood-cricket is the moſt timorous animal in Nature; but the chimney-cricket, being uſed to noiſes, diſregards not only thoſe, but the appearance of people near it. Whether the voice of this animal is formed in the ſame manner with that of the graſshopper, by a fine membrane at the baſe of the wings, which is moved by a muſcle, and which being coiled up, gives a ſound like a quail-pipe is not yet aſcertained; nor do we well know the uſe of this voice, ſince anatomical inſpection has not been able to diſcover the ſmalleſt organs of hearing. Still, however, we can make no doubt of their power of diſtinguiſhing ſounds, though probably not in the ſame manner with the more perfect ranks of Nature. Certain it is that I have often heard them call, and this call was as regularly anſwered by another, although none but the males are vocal.

As the cricket lives chiefly in the dark, ſo its eyes ſeem formed for the gloomineſs of its abode; and thoſe who would ſurpriſe it, have only to light a candle unexpectedly; by which it is dazzled, and cannot find the way back to its retreat. It is a very voracious little animal, and will eat bread, flower, and meat; but it is particularly fond of ſugar.—They never drink, but keep for months together at the back of the chimney, where they could poſſibly have had no moiſture. The warmth of their ſituation only ſerves to increaſe their mirth and loquacity. Except in the very coldeſt weather, they never ceaſe their chirruping, but continue that little piercing note, which is as pleaſing to ſome as it is diſagreeable to others. The great Scaliger was particularly delighted with the chirruping of crickets, and kept ſeveral of them for his amuſement, encloſed in a box, which he placed in a warm ſituation. Others, on the contrary, think there is ſometing ominous and melancholy in the ſound, and uſe every endeavour to baniſh this inſect from their houſes. Ledelius tells us of a woman who was very much incommoded by crickets, and tried, but in vain, every method of baniſhing them from her houſe. She at laſt accidentally ſucceeded; for having one day invited ſeveral gueſts to her houſe, where there was a wedding, in order to increaſe the feſtivity of the entertainment, ſhe procured drums and trumpets to entertain them. The noiſe of thoſe was ſo much greater than what the little animals were uſed to, that they inſtantly forſook their ſituation, and were never heard in that manſion more.

But of all the cricket kind, that which is called the *Mole-Cricket* is the moſt extraordinary. This animal is the largeſt of all the inſects with which we are acquainted in this country, being two inches and a half in length, and three quarters of an inch in breadth. The colour is of a duſky brown; and at the extremity of the tail of a mouſe. The body conſiſts of eight ſcaly joints or ſeparate folds, is brown on the upper part, the more deeply tinged below. The wings are long, narrow, and terminate in a ſharp point, each having a blackiſh line running down it: however, when they are extended, they appear to be much broader than could at firſt ſight be ſuppoſed. The ſhield of the breaſt is of a firm texture, of a blackiſh colour and hairy. The fore-feet, which are this animal's principal inſtruments of burrowing into the earth, are ſtrong, webbed, and hairy; it generally, however, runs backward; but it is commonly under ground, where it burrows even faſter than a mole. It is thought alſo to be amphibious; and capable of living under water, as well as under ground.

Of all inſects this is the moſt deteſted by gardeners, as it chiefly reſides in that ground which lies light, and where it finds ſufficient plenty under the ſurface. Thus, in a ſingle night's time, it will run along a furrow which has been newly ſown, and rob it of all its contents. Its legs are formed in ſuch a manner that it can penetrate the earth in every direction; before, behind, and above it. At night it ventures from its underground habitation, and, like the cricket, has its chirping call. When the female is fecundated, ſhe makes a cell of clammy earth, the inſide of which is large enough to hold two hazle-nuts; and in this ſhe lays her eggs.—The whole neſt is about the ſize of a common hen's egg, cloſed up on every ſide, and well defended from the ſmalleſt breath of air. The eggs generally amount to the number of a hundred and fifty, being white, and about the ſize of a carraway-comfit. They are thus carefully covered, as well to defend them from the injuries of the weather, as from the attacks of the black-beetle; that being itſelf an underground inhabitant, would, but for this precaution, devour or deſtroy them. To prevent this, the female mole-cricket is often poſted as a centinel near the neſt, and when the black invader plunges in to ſeize its prey, the guardian inſect ſeizes him behind, and inſtantly bites him in two.

Nothing can exceed the care and aſſiduity which theſe animals exhibit in the preſervation of their young. Wherever the neſt is placed, there ſeems to be a fortification, avenues, and entrenchments, drawn round it: there are numberleſs winding-ways that lead to it, and a ditch drawn about it, which few of its inſect enemies are able to paſs. But their care is not confined to this only; for at the approach of winter they carry their neſt entirely away, and ſink it deeper in the ground, ſo that the froſt can have no influence in retarding the young brood from coming to maturity. As the weather grows milder, they raiſe their magazine in proportion; till, at laſt, they bring it as near the ſurface as they can, to receive the genial influence of the ſun, without wholly expoſing it to view; yet, ſhould the froſt unexpectedly return, they ſink it again as before.

CHAP. V.

OF THE EARWIG, THE FROTH INSECT, AND OTHERS BELONGING TO THE SECOND ORDER OF INSECTS.

WE ſhould ſtill keep in memory that all inſects of the ſecond order, though not produced quite perfect from the egg, yet want very little of their perfection, and require but a very ſmall change to arrive at that ſtate which ſits them for flight and generation. The natural functions in theſe are never ſuſpended: from the inſtant they leave the egg, they continue to eat, to move, to leap, and purſue their prey: a ſlight change enſues: a ſkin that encloſed a part of their body and limbs, burſts behind, like a woman's ſtays, and gives freedom to a ſet of wings, with which the animal expatiates, and flies in purſuit of its mate.

Of all this claſs of inſects, the earwig undergoes the ſmalleſt change. This animal is ſo common, that it ſcarce needs a deſcription: its ſwiftneſs in the reptile ſtate is not leſs remarkable than its indefatigable velocity when upon the wing. That it muſt be very prolific, appears from its numbers; and that it is very harmleſs, every one's experience can readily teſtify. It is provided with ſix feet, and two feelers: the tail is forked; and with this it often attempts to defend itſelf againſt every aſſailant. But its attempts are only the threats of impotence; they draw down the reſentment of powerful animals, but no way ſerve to defend it. The deformity of its figure, and its ſlender make, have alſo ſubjected it to an imputation, which, though entirely founded in prejudice, has more than once procured its deſtruction. It is ſuppoſed, as the name imports, that it often enters into the ears of people ſleeping; thus cauſing madneſs, from the intolerable pain, and ſoon after death itſelf. Indeed, the French name, which ſignifies the Ear-piercer, urges the calumny againſt this harmleſs inſect in very plain terms: yet nothing can be more unjuſt: the ear is already filled with a ſubſtance which prevents any inſect from entering; and beſides, it is well lined and defended with membranes, which would keep out any little animal, even though the ear-wax were away. Theſe reproaches, therefore, are entirely groundleſs: but it were well if the accuſations which gardeners bring againſt the earwig were as ſlightly founded. There is nothing more certain than that it lives among flowers, and deſtroys them. When fruit alſo has been wounded by flies, the earwig generally comes in for a ſecond feaſt, and ſucks thoſe juices which they firſt began to broach. Still, however, this inſect is not ſo noxious as it would ſeem; and ſeldom is found but where the miſchief has been originally begun by others. Like all of this claſs, the earwig is hatched from an egg. As there are various kinds of this animal, ſo they chooſe different places to breed in: in general, however, they lay their eggs under the bark of plants, or in the clefts of trees, when beginning to decay. They proceed from the egg in that reptile ſtate in which they are moſt commonly ſeen; and, as they grow larger, the wings bound under the ſkin begin to burgeon. It is amazing how very little room four large wings take up before they are protruded; for no perſon could ever conceive ſuch an expanſion of natural drapery could be rolled up in ſo ſmall a pacquet. The ſheath in which they are enveloped, fold and covers them ſo neatly, that the animal ſeems quite deſtitute of wings*; and even when they are burſt from their confinement, the animal, by the power of the muſcles and joints which it has in the middle of its wings, can cloſely fold them into a very narrow compaſs. When the earwig has become a winged inſect, it flies in purſuit of the female, ceaſing to feed, and is wholly employed in the buſineſs of propagation. It lives, in its winged ſtate but a few days; and having taken care for the continuance of poſterity, dries up, and dies to all appearance conſumptive.

To this order of inſects we may alſo refer the Cuckow Spit, or Froth Worm, that is often found hid in that frothy matter we find on the ſurface of plants. It has an oblong, obtuſe body; and a large head, with ſmall eyes. The external wings, for it has four, are of a duſky brown, marked with two white ſpots: the head is black. The ſpume in which it is found wallowing, is all of its own formation, and very much reſembles frothy ſpittle. It proceeds from the vent of the animal, and other parts of the body; and if it be wiped away, a new quantity will be quickly ſeen ejected from the animal's body. Within this ſpume it is ſeen in time to acquire four tubercles on its back, wherein the wings are encloſed: theſe burſting from a reptile, it becomes a winged animal; and thus rendered perfect, it flies to meet its mate, and propagate its kind.

The Water Tipula alſo belongs to this claſs. It has an oblong ſlender body, with four feet fixed upon the breaſt, and four feelers near the mouth. It has four weak wings, which do not at all ſeem proper for flying, but leaping only. But what this inſect chiefly demands our attention for is, the wonderful lightneſs wherewith it runs on the ſurface of the water, ſo as ſcarce to put it in motion. It is ſometimes ſeen in rivers, and on their banks, eſpecially under ſhady trees; and generally in ſwarms of ſeveral together.

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* Swammerdam, p. 114.

The Common Water Fly alſo breeds in the ſame manner with thoſe above-mentioned. This animal is by ſome called Notonecta, becauſe it does not ſwim, in the uſual manner, upon its belly, but on its back: nor can we help admiring that fitneſs in this inſect for its ſituation, as it feeds on the under-ſide of plants which grow on the ſurface of the water; and therefore it is thus formed with its mouth upwards, to take its food with greater convenience and eaſe.

We may alſo add the Water-Scorpion, which is a large inſect, being near an inch in length, and about half an inch in breadth. Its body is nearly oval, but very flat and thin; and its tail long and pointed. The head is ſmall; and the feelers appear like legs, reſembling the claws of a ſcorpion, but without ſharp points. This inſect is generally found in ponds; and is, of all others, the moſt tyrannical and rapacious. It deſtroys, like a wolf among ſheep, twenty times as many as its hunger requires. One of theſe, when put into a baſon of water, in which were thirty or forty worms of the libellula kind, each as large as itſelf deſtroyed them all in a few minutes; getting on their backs, and piercing with its trunk through their body. Theſe animals, however, though ſo formidable to others, are nevertheleſs themſelves greatly over-run with a little kind of louſe, about the ſize of a nit, which very probably repays the injury which the water-ſcorpion inflicts upon others.

The water-ſcorpions live in the water by day; out of which they riſe in the duſk of the evening into the air, and ſo flying from place to place, often betake themſelves, in queſt of food, to other waters. The inſect, before its wings are grown, remains in the place where it was produced; but when come to its ſtate of perfection, ſallies forth in ſearch of a companion of the other ſex, in order to continue its noxious poſterity.

CHAP. VI.

OF THE EPHEMERA.

THE laſt inſect we ſhall add to this ſecond order, is the Ephemera; which, though not ſtrictly belonging to it, yet ſeems more properly referred to this rank than any other Indeed, we muſt not attend to the rigour of method, in a hiſtory where Nature ſeems to take delight to ſport in variety.

That there ſhould be a tribe of flies whoſe duration extends but to a day, ſeems at firſt ſurpriſing; but the wonder will increaſe, when we are told, that ſome of this kind ſeem to be born to die in the ſpace of a ſingle hour. The reptile, however, from which they are bred, is by no means ſo ſhort lived; but is ſometimes ſeen to live two years, and many times three years together.

All Ephemeras, of which there are various kinds, are produced from the egg, in the form of worms; from whence they change into a more perfect form; namely, that of Aurelias, which is a kind of middle ſtate between a worm and a fly: and from thence they take their laſt mutation, which is into a beautiful fly, of longer or ſhorter duration, according to its kind.

The ephemera, in its fly ſtate, is a very beautiful winged inſect, and has a ſtrong ſimilitude to the butterfly, both from its ſhape and its wings. It is about the ſize of a middling butterfly; but its wings differ, in not being covered with the painted duſt with which thoſe of butterflies are adorned, and rendered opake, for they are very tranſparent and very thin. Theſe inſects have four wings, the uppermoſt of which are much the largeſt: when the inſect is at reſt, it generally lays its wings one over the other, on the back. The body is long, being formed of ſix rings, that are larger at the origin than near the extremity; and from this a tail proceeds, that is longer than all the reſt of the fly, and conſiſts ſometimes of three threads of an equal length, or ſometimes of two long and one ſhort. To acquire this beautiful form, the inſect has been obliged to undergo ſeveral tranſmutations: but its glory is very ſhort lived, for the hour of its perfection is the hour of its death; and it ſeems ſcarcely introduced to pleaſure, when it is obliged to part with life.

The reptile that is to became a fly, and that is granted ſo long a term, when compared to its latter duration, is an inhabitant of the water, and bears a very ſtrong reſemblance to fiſhes, in many particulars: having gills by which it breathes at the bottom, and alſo the tapering form of aquatic animals. Theſe inſects have ſix ſcaly legs, fixed on their corſelet. Their head is triangular: the eyes are placed forward, and may be diſtinguiſhed by their largeneſs and colour. The mouth is furniſhed with teeth; and the body conſiſts of ſix rings; that next the corſelet being largeſt, but growing leſs and leſs to the end: the laſt ring is the ſhorteſt, from which the three threads proceed, which are as long as the whole body. Thus we ſee that the reptile bears a very ſtrong reſemblance to the fly; and only requires wings, to be very near its perfection.

As there are ſeveral kinds of this animal, their aurelias are conſequently of different colours; ſome yellow, ſome brown, and ſome cream-coloured. Some of theſe alſo bore themſelves cells at the bottom of the water, from which they never ſtir out, but feed upon the mud compoſing the walls of their habitation, in contented captivity; others, on the contrary, range about, go from the bottom to the ſurface, ſwim between two waters, quit that element entirely to feed upon plants by the river ſide, and then return to their favourite element, for ſafety and protection.

The reptile, however, though it lives two or three years, offers but little, in its long duration, to excite curioſity: it is hid at the bottom of the water, and feeds almoſt wholly within it narrow habitation. The moſt ſtriking fact command our attention during the ſhort interval of its fly ſtate; into which it crowds the moſt various tranſactions of its little life. It then may be ſaid to be in a hurry to live, as it has but ſo ſmall a time to exiſt. The peculiar ſign whereby to know that theſe reptiles will change into flies in a ſhort time, conſiſts in a protuberance of the wings on the back.— About that time the ſmooth and depreſſed form of the upper part of the body is changed into a more ſwolen and rounder ſhape; ſo that the wings are in ſome degree viſible through the external ſheath that covers them. As they are not natives of England, he who would ſee them in their greateſt abundance, muſt walk, about ſun-ſet, along the banks of the Rhine, or the Seine, near Paris; where, for about three days, in the midſt of ſummer, he will be aſtoniſhed at their numbers and aſſiduity. The thickeſt deſcent of the flakes of ſnow in winter ſeem not to equal their number; the whole air ſeems alive with the new-born race; and the earth itſelf is all over covered with their remains. The aurelias, or reptile inſects, that are as yet beneath the ſurface of the water, wait only for the approach of evening to begin their transformation. The moſt induſtrious ſhake off their old garments about eight o'clock; and thoſe who are the moſt tardy, are transformed before nine.

We have already ſeen that the operation of change in other inſects is laborious and painful; but with theſe nothing ſeems ſhorter, or performed with greater eaſe. The aurelias are ſcarce lifted above the ſurface of the water, than their old ſheathing ſkin burſts; and through the cavity which is thus formed, a fly iſſues, whoſe wings, at the ſame inſtant, are unfolded, and at the ſame time lift it into the air. Millions and millions of aurelias, riſe in this manner to the ſurface; and at once become flies, and fill every quarter with their flutterings. But all theſe ſports are ſhortly to have an end; for as the little ſtrangers live but an hour or two, the whole ſwarm ſoon falls to the ground, and covers the earth, like a deep ſnow, for ſeveral hundred yards, on every ſide of the river. Their numbers are then incredible, and every object they touch becomes fatal to them; for they inſtantly die, if they hit againſt even each other.

At this time the males and females are very differently employed. The males, quite inactive and apparently without deſires, ſeem only born to die; no way like the males of other inſects; they neither follow the oppoſite ſex, nor bear any enmity to each other: after fluttering for an hour or two, they drop upon land, without ſeeming to receive wings for ſcarce any other purpoſe but to ſatisfy an idle curioſity. It is otherwiſe with the females; that are ſcarce riſen from the ſurface of the water, and have dried their wings, but they haſten to drop their eggs back again. If they happen alſo to flutter upon land, they depoſit their burthen in the place where they drop. But then it may be demanded, where, and in what manner, are theſe eggs fecundated, as no copulation whatever appears between the ſexes, in their tranſitory viſits in air? Swammerdam is of opinion that they are impregnated in the manner of fiſh-ſpawn, by the male, after being ejected by the female: but, beſide that this doctrine is exploded even from the hiſtory of fiſhes, it is certain that the males have not time for this operation, as the eggs drop to the bottom the inſtant they are laid on the water. Reaumur is of opinion that they copulate; but that the act bears a proportion in ſhortneſs to the ſmall duration of their lives; and, conſequently, muſt be ſoon performed, as to be ſcarcely viſible. This, however, is at beſt forcing a theory; and, it is probable, that as there are many inſects known to breed without any impregnation from the male, as we have already ſeen in muſcles and oyſters, and ſhall hereafter ſee in the gnat, and a ſpecies of the beetle, ſo the ephemera may be of this number. Be this as it may, the females are in ſuch haſte to depoſit their eggs, that multitudes of them fall to the ground; but the greateſt part are laid in the water. As they flutter upon the ſurface, two cluſters are ſeen iſſuing from the extremity of their body, each containing about three hundred and fifty eggs, which make ſeven hundred in all. Thus, of all inſects, this appears to be the moſt prolific; and it would ſeem that there was a neceſſity for ſuch a ſupply, as, in its reptile ſtate, it is the favourite food of every kind of freſh-water fiſh. It is in vain that theſe little animals form galleries at the bottom of the river, from whence they ſeldom remove; many kinds of fiſh break in upon their retreats, and thin their numbers. For this reaſon fiſhermen are careful to provide themſelves with theſe inſects, as the moſt grateful bait; and thus turn the fiſh's rapacity to its own deſtruction.

But though the uſual date of thoſe flies is two or three hours at fartheſt, there are ſome kinds that live ſeveral days; and one kind in particular, after quitting the water, has another caſe or ſkin to get rid of. Theſe are often ſeen in the fields and woods, diſtant from the water; but they are more frequently found in its vicinity. They are often found ſticking upon walls and trees; and frequently with the head downwards, without changing place, or having any ſenſible motion. They are then waiting for the moment when they ſhall be diveſted of their laſt incommodious garment, which ſometimes does not happen for two or three days together.

BOOK III.

OF INSECTS OF THE THIRD ORDER.

CHAP. I.

OF CATERPILLARS IN GENERAL.

IF we take a curſory view of inſects in general, caterpillars alone, and the butterflies and moths they give birth to, will make a third part of the number. Wherever we move, wherever we turn, theſe inſects, in one ſhape or another, preſent themſelves to our view. Some, in every ſtate, offer the moſt entertaining ſpectacle; others are beautiful only in their winged form. Many perſons, of which number I am one, have an invincible averſion to caterpillars and worms of every ſpecies: there is ſomething diſagreeable in their ſlow, crawling motion, for which the variety of their colouring can never compenſate. But others feel no repugnance at obſerving, and even handling them with the moſt attentive application.

There is nothing in the butterfly ſtate ſo beautiful or ſplendid as theſe inſects. They ſerve, not leſs than the birds themſelves, to baniſh ſolitudes from our walks, and to fill up our idle intervals with the moſt pleaſing ſpeculations. The butterfly makes one of the principal ornaments of oriental poetry; but in thoſe countries, the inſect is larger and more beautiful than with us.

The beauties of the fly may, therefore, very well excite our curioſity to examine the reptile. But we are ſtill more ſtrongly attached to this tribe from the uſefulneſs of one of the number. The ſilk-worm is, perhaps, the moſt ſerviceable of all other animals; ſince, from its labours, and the manufacture attending it, near a third part of the world are clothed, adorned, and ſupported.

Caterpillars may be eaſily diſtinguiſhed from worms or maggots, by the number of their feet; and by their producing butterflies or moths. When the ſun calls up vegetation, and vivifies the various eggs of inſects, the caterpillars are the firſt that are ſeen, upon almoſt every vegetable and tree, eating its leaves, and preparing for a ſtate of greater perfection. They have feet both before and behind; which not only enable them to move forward by a ſort of ſteps made by their fore and hinder parts, but alſo to climb up vegetables, and to ſtretch themſelves out from the boughs and ſtalks to reach their food, at a diſtance. All of this claſs have from eight feet, at the leaſt, to ſixteen; and this may ſerve to diſtinguiſh them from the worm tribe, that never have ſo many. The animal into which they are converted is always a butterfly or a moth; and theſe are always diſtinguiſhed from other flies, by having their wings covered over with a painted duſt, which gives them ſuch various beauty. The wings of flies are tranſparent, as we ſee in the common fleſh-fly; while thoſe of beetles are hard, like horn: from ſuch the wing of a butterfly may be eaſily diſtinguiſhed; and words would obſcure their differences.

From hence it appears that caterpillars, whether in the reptile ſtate, or advanced to their laſt ſtate of perfection, into butterflies, may eaſily be diſtinguiſhed from all other inſects; being animals peculiarly formed, and alſo of a peculiar nature. The tranſmutations they undergo, are alſo more numerous than thoſe of any inſect hitherto mentioned; and, in conſequence, they have been placed in the third order of changes by Swammerdam, who has thrown ſuch lights upon this part of natural hiſtory. In the ſecond order of changes, mentioned before, we ſaw the graſshopper and the earwig, when excluded from the egg, aſſume a form very like that which they were after to preſerve; and ſeemed arrived at a ſtate of perfection, in all reſpects, except in not having wings; which did not bud forth until they were come to maturity. But the inſects of this third order, that we are now about to deſcribe, go through a much greater variety of transformations: for when they are excluded from the egg, they aſſume the form of a ſmall caterpillar, which feeds and grows larger every day, often changing its ſkin, but ſtill preſerving its form. When the animal has come to a certain magnitude in this ſtate it diſcontinues eating, makes itſelf a covering or huſk, in which it remains wrapped up ſeemingly without life or motion; and after having for ſome time continued in this ſtate, it once more burſts its confinement, and comes forth a butterfly. Thus we ſee this animal put on no leſs than three different appearances, from the time it is firſt excluded from the egg. It appears a crawling caterpillar; then an inſenſible aurelia, as it is called, without life or motion; and laſtly, a beautiful butterfly, variouſly painted, according to its different kind. Having thus diſtinguiſhed this claſs of inſects from all others, we will firſt ſurvey their hiſtory in general; and then enter particularly into the manners and nature of a few of them, which moſt deſerve our curioſity and attention.

CHAP. II.

OF THE TRANSFORMATION OF THE CATERPILLAR INTO ITS CORRESPONDING BUTTERFLY OR MOTH.

WHEN winter has diſrobed the trees of their leaves, Nature then ſeems to have loſt her inſects. There are thouſands of different kinds, with and without wings, which, though ſwarming at other ſeaſons, then entirely diſappear. Our fields are re-peopled, when the leaves begin to bud, by the genial influence of ſpring; and caterpillars, of various ſorts, are ſeen feeding upon the promiſe of the year, even before the leaves are completely unfolded. Thoſe caterpillars, which we then ſee, may ſerve to give us a view of the general means which Nature employs to preſerve ſuch a number of inſects during that ſeaſon, when they can no longer find ſubſiſtence. It is known, by united experience, that all theſe animals are hatched from the eggs of butterflies; and thoſe who obſerve them more cloſely, will find the fly very careful in depoſiting its eggs in thoſe places where they are likely to be hatched with the greateſt ſafety and ſucceſs. During winter, therefore, the greateſt number of caterpillars are in an egg ſtate; and in this lifeleſs ſituation, brave all the rigours and the humidity of the climate; and though often expoſed to all its changes, ſtill preſerve the latent principles of life, which is more fully exerted at the approach of ſpring. That ſame power that puſhes forth the budding leaf, and the opening flower, impels the inſect into animation; and Nature at once ſeems to furniſh the gueſt and the banquet. When the inſect has found force to break its ſhell, it always finds its favourite aliment provided in abundance before it.

But all caterpillars are not ſent off from the egg in the beginning of ſpring; for many of them have ſubſiſted during the winter in their aurelia ſtate: in which, as we have briefly obſerved above, the animal is ſeemingly deprived of life and motion. In this ſtate of inſenſibility, many of theſe inſects continue during the rigours of winter; ſome encloſed in a kind of ſhell, which they have ſpun for themſelves at the end of autumn; ſome concealed under the bark of trees; others in the chinks of old walls; and many buried under ground From all theſe, a variety of butterflies are ſeen to iſſue, in the beginning of ſpring; and adorn the earlieſt part of the year with their painted flutterings.

Some caterpillars do not make any change whatſoever at the approach of winter; but continue to live in their reptile ſtate, through all the ſeverity of the ſeaſon. Theſe chooſe themſelves ſome retreat, where they may remain undiſturbed for ſome months together; and there they remain quite motionleſs, and as inſenſible as if they were actually dead. Their conſtitution is ſuch, that food at that time, would be uſeleſs; and the cold prevents their making thoſe diſſipations which require reſtoration. In general, caterpillars of this kind are found in great numbers together, encloſed in one common web, that covers them all, and ſerves to protect them from the injuries of the air.

Laſtly, there are ſome of the caterpillar kind, whoſe butterflies live all the winter; and who, having fluttered about for ſome part of the latter end of autumn, ſeek for ſome retreat during the winter, in order to anſwer the ends of propagation, at the approach of ſpring. Theſe are often found lifeleſs and motionleſs in the hollows of trees, or the clefts of timber; but, by being approached to the fire, they recover life and activity, and ſeem to anticipate the deſires of the ſpring.

In general, however, whether the animal has ſubſiſted in an egg ſtate, during the winter; or whether as a butterfly, bred from an aurelia, in the beginning of ſpring; or a butterfly that has ſubſiſted during the winter, and lays eggs as ſoon as the leaves of plants are ſhot forward, the whole ſwarm of caterpillars are in motion to ſhare the banquet that Nature has provided. There is ſcarce a plant that has not its own peculiar inſects; and ſome are known to ſupport ſeveral of different kinds. Of theſe, many are hatched from the egg, at the foot of the tree, and climb up to its leaves for ſubſiſtence: the eggs of others, have been glued by the parent butterfly to the leaves; and they are no ſooner excluded from the ſhell, but they find themſelves in the midſt of plenty.

When the caterpillar firſt burſts from the egg, it is ſmall and feeble; its appetites are in proportion to its ſize, and it ſeems to make no great conſumption: but as it increaſes in magnitude, it improves in its appetites; ſo that, in its adult caterpillar ſtate, it is the moſt ravenous of all animals whatſoever. A ſingle caterpillar will eat double its own weight of leaves in a day, and yet ſeems no way diſordered by the meal.—What would mankind do, if their oxen or their horſes were ſo voracious!

Theſe voracious habits, with its ſlow crawling motion, but ſtill more a ſtinging like that of nettles, which follows upon handling the greateſt number of them, make theſe inſects not the moſt agreeable objects of human curioſity. However, there are many philoſophers who have ſpent years in their contemplation; and who have not only attended to their habits and labours, but minutely examined their ſtructure and internal conformation.

The body of the caterpillar, when anatomically conſidered, is found compoſed of rings, whoſe circumference is pretty near circular or oval. They are generally twelve in number, and are all membranaceous; by which caterpillars may be diſtinguiſhed from many other inſects, that nearly reſemble them in form. The head of the caterpillar is connected to the firſt ring by the neck; that is generally ſo ſhort and contracted, that it is ſcarce viſible. All the covering of the head in caterpillars ſeems to conſiſt of a ſhell; and they have neither upper nor under jaw, for they are both placed rather vertically, and each jaw armed with a large thick tooth, which is ſingly equal to number. With theſe the animals devour their food in ſuch amazing quantities; and with theſe, ſome of the kind defend themſelves againſt their enemies. Though the mouth be kept ſhut, the teeth are always kept uncovered; and while the inſect is in health, they are ſeldom without employment. Whatever the caterpillar devours, theſe teeth ſerve to chop it into ſmall pieces, and render the parts of the leaf fit for ſwallowing. Many kinds, while they are yet young, eat only the ſucculent part of the leaf, and leave all the fibres untouched; others, however, attack the whole leaf, and eat it clean away. One may be amuſed, for a little time, in obſerving the avidity with which they are ſeen to feed; ſome are ſeen eating the whole day; others have their hours of repaſt; ſome chooſe the night, and others the day. When the caterpillar attacks a leaf, it places its body in ſuch a manner that the edge of the leaf ſhall fall between its feet, which keeps it ſteady, while the teeth are employed in cutting it: theſe fall upon the leaf, ſomewhat in the manner of a pair of gardener's ſheers; and every morſel is ſwallowed as ſoon as cut. Some caterpillars feed upon leaves ſo very narrow, that they are not broader than their mouths; in this caſe the animal is ſeen to devour it from the point, as we would eat a radiſh.

As there are various kinds of caterpillars, the number of their feet are various; ſome having eight, and ſome ſixteen. Of theſe feet the ſix foremoſt are covered with a ſort of ſhining griſtle; and are therefore called the ſhelly legs. The hindmoſt feet, whatever be their number, are ſoft and flexible, and are called membranaceous. Caterpillars alſo, with regard to their external figure, are either ſmooth or hairy. The ſkin of the firſt kind is ſoft to the touch, or hard like ſhagreen; the ſkin of the latter is hairy, and, as it were, thorny; and generally, if handled, ſtings like nettles. Some of them even cauſe this ſtinging pain, if but approached too nearly.

Caterpillars, in general, have ſix ſmall black ſpots placed on the circumference of the fore ring, and a little to the ſide of the head. Three of theſe are larger than the reſt, and are convex and tranſparent: theſe Reaumur takes to be the eyes of the caterpillar; however, moſt of theſe reptiles have very little occaſion for ſight, and ſeem only to be directed by their feeling.

But the parts of the caterpillar's body which moſt juſtly demand our attention, are the ſtigmata, as they are called; or thoſe holes on the ſides of its body, through which the animal is ſuppoſed to breathe. All along this inſect's body on each ſide, theſe holes are eaſily diſcoverable. They are eighteen in number, nine on a ſide, rather nearer the belly than the back; a hole for every ring, of which the animal's body is compoſed, except the ſecond, the third, and the laſt. Theſe oval openings may be conſidered as ſo many mouths, through which the inſect breathes; but with this difference, that as we have but one pair of lungs, the caterpillar has no leſs than eighteen. It requires no great anatomical dexterity to diſcover theſe lungs in the larger kind of caterpillars: they appear, at firſt view, to be hollow cartilaginous tubes, and of the colour of mother-of-pearl. Theſe tubes are often ſeen to unite with each other; ſome are perceived to open into the inteſtines; and ſome go to different parts of the ſurface of the body. That theſe veſſels ſerve to convey the air, appears evidently, from the famous experiment of Malpighi; who, by ſtopping up the mouths of the ſtigmata with oil, quickly ſuffocated the animal, which was ſeen to die convulſed the inſtant after. In order to aſcertain his theory, he rubbed oil upon other parts of the inſect's body, leaving the ſtigmata free; and this ſeemed to have no effect upon the animal's health, but it continued to move and eat as uſual: he rubbed oil on the ſtigmata of one ſide, and the animal underwent a partial convulſion, but recovered ſoon after. However it ought to be obſerved, that air is not ſo neceſſary to theſe as to the nobler ranks of animals, ſince caterpillars will live in an exhauſted receiver for ſeveral days together; and though they ſeem dead at the bottom, yet, when taken out, recover, and reſume their former vivacity.

If the caterpillar be cut open longitudinally along the back, its inteſtines will be perceived running directly in a ſtraight line from the mouth to the anus. They reſemble a number of ſmall bags opening into each other; and ſtrengthened on both ſides by a fleſhy cord, by which they are united. Theſe inſects are, upon many occaſions, ſeen to caſt forth the internal coat of their inteſtines with their food, in the changes which they ſo frequently undergo. But the inteſtines take up but a ſmall part of the animal's body, if compared to the fatty ſubſtance in which they are involved. This ſubſtance changes its colour when the inſect's metamorphoſis begins to approach; and from white it is uſually ſeen to become yellow. If to theſe parts, we add the caterpillar's implements for ſpinning, (for all caterpillar's ſpin at one time or another) we ſhall have a rude ſketch of this animal's conformation: however we ſhall reſerve the deſcription of thoſe parts, till we come to the hiſtory of the ſilk-worm, where the manner in which theſe inſects ſpin their webs, will moſt properly find place.

The life of a caterpillar ſeems one continued ſucceſſion of changes; and it is ſeen to throw off one ſkin only to aſſume another; which alſo is diveſted in its turn: and thus for eight or ten times ſucceſſively. We muſt not, however, confound this changing of the ſkin with the great metamorphoſis which it is afterwards to undergo. The throwing off one ſkin, and aſſuming another, ſeems, in compariſon, but a ſlight operation among theſe animals: this is but the work of a day; the other is the great adventure of their lives. Indeed, this faculty of changing the ſkin, is not peculiar to caterpillars only, but is common to all the inſect kind; and even to ſome animals that claim a higher rank in Nature. We have already ſeen the lobſter and the crab out-growing their firſt ſhells, and then burſting from their confinement, in order to aſſume a covering more roomy and convenient. It is probable that the louſe, the flea, and the ſpider, change their covering from the ſame neceſſity; and growing too large for the cruſt in which they have been for ſome time encloſed, burſt it for another. This period is probably that of their growth; for as ſoon as their new ſkin is hardened round them, the animal's growth is neceſſarily circumſcribed, while it remains within it. With reſpect to caterpillars, many of them change their ſkins five or ſix times in a ſeaſon; and this covering, when caſt off, often ſeems ſo complete, that many might miſtake the empty ſkin for the real inſect. Among the hairy caterpillars, for inſtance, the caſt ſkin is covered with hair; the feet, as well griſtly as membraneous, remain fixed to it; even the parts which nothing but a microſcope can diſcover, are viſible in it; in ſhort, all the parts of the head; not only the ſkull but the teeth.

In proportion as the time approaches in which the caterpillar is to caſt its old ſkin, its colours become more feeble, the ſkin ſeems to wither and grow dry, and in ſome meaſure reſembles a leaf, when it is no longer ſupplied with moiſture from the ſtock. At that time, the inſect begins to find itſelf under a neceſſity of changing; and it is not effected without violent labour, and perhaps pain. A day or two before the critical hour approaches, the inſect ceaſes to eat, loſes its uſual activity, and ſeems to reſt immoveable. It ſeeks ſome place to remain in ſecurity; and no longer timorous, ſeems regardleſs even of the touch. It is now and then ſeen to bend itſelf and elevate its back; again it ſtretches to its utmoſt extent: it ſometimes lifts up the head, and then lets it fall again; it ſometimes waves it three or four times from ſide to ſide, and then remains in quiet. At length, ſome of the rings of its body, particularly the firſt and ſecond, are ſeen to ſwell conſiderably, the old ſkin diſtends and burſts, till, by repeated ſwellings and contractions in every ring, the animal diſengages itſelf, and creeps from its inconvenient covering.

How laborious ſoever this operation may be, it is performed in the ſpace of a minute; and the animal, having thrown off its old ſkin, ſeems to enjoy new vigour, as well as acquired colouring and beauty. Sometimes it happens that it takes a new appearance and colours very different from the old. Thoſe that are hairy, ſtill preſerve their covering; although their ancient ſkin ſeems not to have loſt a ſingle hair: every hair appears to have been drawn, like a ſword from the ſcabbard. However, the fact is, that a new crop of hair grows between the old ſkin and the new, and probably helps to throw off the external covering.

The caterpillar having in this manner continued for ſeveral days feeding, and at intervals caſting its ſkin, begins at laſt to prepare for its change into an aurelia. It is moſt probable that, from the beginning, all the parts of the butterfly lay hid in this inſect, in its reptile ſtate; but it required time to bring them to perfection; and a large quantity of food, to enable the animal to undergo all the changes requiſite for throwing off theſe ſkins, which ſeem to clog the butterfly form. However, when the caterpillar has fed ſufficiently, and the parts of the future butterfly have formed themſelves beneath its ſkin, it is then time for it to make its firſt, great, and principal change into an aurelia, or a cryſalis, as ſome have choſen to call it; during which, as was obſerved, it ſeems to remain for ſeveral days, or even months, without life or motion.

Preparatory to this important change, the caterpillar moſt uſually quits the plant, or the tree on which it fed; or at leaſt attaches itſelf to the ſtalk of the ſtem, more gladly than the leaves. It forſakes its food, and prepares, by faſting, to undergo its tranſmutation. In this period, all the food it has taken is thoroughly digeſted; and it often voids even the internal membrane which lined its inteſtines. Some of this tribe, at this period alſo, are ſeen entirely to change colour; and the vivacity of the tints, in all, ſeems faded. Thoſe of them which are capable of ſpinning themſelves a web, ſet about this operation; thoſe which have already ſpun, await the change in the beſt manner they are able. The web or cone, with which ſome cover themſelves, hides the aurelia contained within from the view; but in others, where it is more tranſparent, the caterpillar, when it has done ſpinning, ſtrikes into the claws of the two feet under the tail, and afterwards forces in the tail itſelf, by contracting thoſe claws, and violently ſtriking the feet one againſt the other. If, however, they be taken from their web at this time, they appear in a ſtate of great langour; and, incapable of walking, remain on that ſpot where they are placed. In this condition they remain one or two days, preparing to change into an aurelia; ſomewhat in the manner they made preparations for changing their ſkin. They then appear with their bodies bent into a bow, which they now and then are ſeen to ſtraighten: they make no uſe of their legs; but if they attempt to change place, do it by the contortions of their body. In proportion as their change into an aurelia approaches, their body becomes more and more bent; while their extenſions and convulſive contractions become more frequent. The hinder end of the body is the part which the animal diſengages from its caterpillar ſkin; that part of the ſkin remains empty, while the body is drawn up contractedly towards the head. In the ſame manner they diſengage themſelves from the two ſucceeding rings; ſo that the animal is then lodged entirely in the fore part of its caterpillar covering: that half which is abandoned, remains placid and empty; while the fore-part, on the contrary, is ſwollen and diſtended. The animal, having thus quitted the hinder part of its ſkin, to drive itſelf up into the fore part, ſtill continues to heave and work as before; ſo that the ſkull is ſoon ſeen to burſt into three pieces, and a longitudinal opening is made in the three firſt rings of the body, through which the inſect thruſts forth its naked body with ſtrong efforts. Thus at laſt it entirely gets free from its caterpillar ſkin, and for ever forſakes its moſt odious reptile form.

The caterpillar, thus ſtripped of its ſkin for the laſt time, is now become an aurelia; in which the parts of the future butterfly are all viſible; but in ſo ſoft a ſtate, that the ſmalleſt touch can diſcompoſe them. The animal is now become helpleſs and motionleſs; but only waits for the aſſiſtance of the air to dry up the moiſture on its ſurface, and ſupply it with a cruſt capable of reſiſting external injuries. Immediately after being ſtripped of its caterpillar ſkin, it is of a green colour, eſpecially in thoſe parts which are diſtended by an extraordinary afflux of animal moiſture; but in ten or twelve hours after being thus expoſed, its parts harden, the air forms its external covering into a firm cruſt, and in about four and twenty hours, the aurelia may be handled without endangering the little animal that is thus left in ſo defenceleſs a ſituation. Such is the hiſtory of the little pod or cone that is found ſo common by every pathway, ſticking to nettles, and ſometimes ſhining like poliſhed gold. From the beautiful and reſplendent colour, with which it is thus ſometimes adorned, ſome authors have called it a Cryſalis, implying a creature made of gold.

Such are the efforts by which theſe little animals prepare for a ſtate of perfection; but their care is ſtill greater to provide themſelves a ſecure retreat, during this ſeaſon of their imbecility. It would ſeem like erecting themſelves a monument, where they were to reſt ſecure, until Nature had called them in a new and more improved exiſtence. For this purpoſe, ſome ſpin themſelves a cone or web, in which they lie ſecure till they have arrived at maturity: others, that cannot ſpin ſo copious a covering, ſuſpend themſelves by the tail, in ſome retreat where they are not likely to meet diſturbances. Some mix ſand with their gummy and moiſt webs, and thus make themſelves a ſecure incruſtation; while others, before their change, bury themſelves in the ground, and thus avoid the numerous dangers that might attend them. One would imagine that they were conſcious of the preciſe time of their continuance in their aurelia ſtate; ſince their little ſepulchres, with reſpect to the ſolidity of the building, are proportioned to ſuch duration. Thoſe that are to lie in that ſtate of exiſtence but a few days, make choice of ſome tender leaf, which they render ſtill more pliant by diffuſing a kind of glue upon it: the leaf thus gradually curls up, and withering as it enfolds, the inſect wraps itſelf within, as in a mantle, till the genial warmth of the ſun enables it to ſtruggle for new life, and burſt from its confinement. Others, whoſe time of tranſformation is alſo near at hand, faſten their tails to a tree, or to the firſt worm-hole they meet, in a beam, and wait in that defenceleſs ſituation. Such caterpillars, on the other hand, as are ſeen to lie ſeveral months in their aurelia ſtate, act with much greater circumſpection. Moſt of them mix their web with ſand, and thus make themſelves a ſtrong covering: others build in wood, which ſerves them in the nature of a coffin. Such as have made the leaves of willows their favourite food, break the tender twigs of them firſt into ſmall pieces, then pound them as it were to powder; and, by means of their glutinous ſilk, make a kind of paſte, in which they wrap themſelves up. Many are the forms which theſe animals aſſume in this helpleſs ſtate; and it often happens, that the moſt deformed butterflies iſſue from the moſt beautiful aurelias.

In general, however, the aurelia takes the rude outline of the parts of the animal which is contained within it; but as to the various colours which it is ſeen to aſſume, they are rather the effect of accident; for the ſame ſpecies of inſect does not at all times aſſume the ſame hue, when it becomes an aurelia. In ſome, the beautiful gold colour is at one time found; in others, it is wanting. This brilliant hue, which does not fall ſhort of the beſt gilding, is formed in the ſame manner in which we ſee leather obtain a gold colour, though none of that metal ever enters into the tincture. It is only formed by a beautiful brown varniſh, laid upon a white ground; and the white thus gleaming through the tranſparency of the brown, gives a charming golden yellow. Theſe two colours are found, one over the other, in the aurelia of the little animal we are deſcribing; and the whole appears gilded, without any real gilding.

The aurelia thus formed, and left to time to expand into a butterfly, in ſome meaſure reſembles an animal in an egg, that is to wait for external warmth to hatch it into life and vigour. As the quantity of moiſture that is encloſed within the covering of the aurelia, continues to keep its body in the moſt tender ſtate, ſo it is requiſite that this humidity ſhould be dried away, before the little butterfly can burſt its priſon. Many have been the experiments to prove that Nature may in this reſpect be aſſiſted by art; and that the life of the inſect may be retarded or quickened, without doing it the ſmalleſt injury. For this purpoſe, it is only requiſite to continue the inſect in its aurelia ſtate, by preventing the evaporation of its humidity; which will conſequently add ſome days, nay weeks, to its life: on the other hand, by evaporating its moiſture, in a warm ſituation, the animal aſſumes its winged ſtate before its uſual time, and goes through the offices aſſigned its exiſtance. To prove this, Mr. Reaumur encloſed the aurelia in a glaſs tube: and found the evaporated water, which exhaled from the body of the inſect, collected in drops at the bottom of the tube: he covered the aurelia with varniſh; and this making the evaporation more difficult and ſlow, the butterfly was two months longer than its natural term, in coming out of its caſe: he found, on the other hand, that by laying the animal in a warm room, he haſtened the diſcloſure of the butterfly; and by keeping it in an ice-houſe in the ſame manner he delayed it. Warmth acted, in this caſe, in a double capacity; invigorating the animal, and evaporating the moiſture.

The aurelia, though it bears a different external appearance, nevertheleſs contains within it all the parts of the butterfly in perfect formation; and lying each in a very orderly manner, though in the ſmalleſt compaſs. Theſe, however, are ſo faſt and tender, that it is impoſſible to viſit without diſcompoſing them. When either by warmth, or increaſing vigour, the parts have acquired the neceſſary force and ſolidity, the butterfly then ſeeks to diſembarraſs itſelf of thoſe bands which kept it ſo long in confinement. Some inſects continue under the form of an aurelia not above ten days; ſome twenty; ſome ſeveral months; and even for a year together.

The butterfly, however, does not continue ſo long under the form of an aurelia, as one would be apt to imagine. In general, thoſe caterpillars that provide themſelves with cones, continue within them but a few days after the cone is completely finiſhed. Some, however, remain buried in this artificial covering for eight or nine months, without taking the ſmalleſt ſuſtenance during the whole time: and though in the caterpillar ſtate no animals were ſo voracious, when thus transformed, they appear a miracle of abſtinence. In all, ſooner or later, the butterfly burſts from its priſon; not only that natural priſon which is formed by the ſkin of the aurelia, but alſo from that artificial one of ſilk, or any other ſubſtance in which it encloſed itſelf.

The efforts which the butterfly makes to get free from its aurelia ſtate, are by no means ſo violent as thoſe which the inſect had in changing from the caterpillar into the aurelia. The quantity of moiſture ſurrounding the butterfly is by no means ſo great as that attending its former change; and the ſhell of the aurelia is ſo dry, that it may be cracked between the fingers.

If the animal be ſhut up within a cone, the butterfly always gets rid of the natural internal ſkin of the aurelia, before it eats its way through the external covering which its own induſtry has formed round it. In order to obſerve the manner in which it thus gets rid of the aurelia covering, we muſt cut open the cone, and then we ſhall have an opportunity of diſcovering the inſect's efforts to emancipate itſelf from its natural ſhell. When this operation begins, there ſeems to be a violent agitation in the humours contained within the little animal's body. Its fluid ſeems driven, by an haſty fermentation, through all the veſſels; while it labours violently with its legs, and makes ſeveral other violent ſtruggles to get free. As all theſe motions concur with the growth of the inſect's wings and body, it is impoſſible that the brittle ſkin which covers it ſhould longer reſiſt: it at length gives way, by burſting into four diſtinct and regular pieces. The ſkin of the head and legs firſt ſeparates; then the ſkin at the back flies open, and dividing into two regular portions, diſengages the back and wings: then there likewiſe happens another rupture in that portion which covered the rings of the back of the aurelia. After this, the butterfly, as if fatigued with its ſtruggles, remains very quiet for ſome time, with its wings pointed downwards, and its legs fixed in the ſkin which it had juſt thrown off. At firſt ſight the animal, juſt ſet free, and permitted the future uſe of its wings, ſeems to want them entirely: they take up ſuch little room, that one would wonder where they were hidden. But ſoon after, they expand ſo rapidly, that the eye can ſcarce attend their unfolding. From reaching ſcarce half the length of the body, they acquire, in a moſt wonderful manner, their full extent and bigneſs, ſo as to be each five times larger than they were before. Nor is it the wings alone that are thus increaſed: all their ſpots and paintings, before ſo minute as to be ſcarce diſcernible, are proportionably extended; ſo that, what a few minutes before ſeemed only a number of confuſed, unmeaning points, now become diſtinct and moſt beautiful ornaments. Nor are the wings, when they are thus expanded, unfolded in the manner in which earwigs and graſshoppers diſplay theirs, who unfurl them like a lady's fan: on the contrary, thoſe of butterflies actually grow to their natural ſize in this very ſhort ſpace. The wing, at the inſtant it is freed from its late confinement, is conſiderably thicker than afterwards; ſo that it ſpreads in all its dimenſions, growing thinner as it becomes broader. If one of the wings be plucked from the animal juſt ſet free, it may be ſpread by the fingers, and it will ſoon become as broad as the other, which has been left behind. As the wings extend themſelves ſo ſuddenly, they have not yet had time to dry; and accordingly appear like pieces of wet paper, ſoft, and full of wrinkles. In about half an hour, they are perfectly dry, their wrinkles entirely diſappear, and the little animal aſſumes all its ſplendour. The tranſmutation being thus perfectly finiſhed, the butterfly diſcharges three or four drops of a blood-coloured liquid, which are the laſt remains of its ſuperfluous moiſture. Thoſe aurelias which are encloſed within a cone, find their exit more difficult, as they have ſtill another priſon to break through: this, however, they perform in a ſhort time; for the butterfly, freed from its aurelia ſkin, butts with its head violently againſt the walls of its artificial priſon; and probably with its eyes, that are rough and like a file, it rubs the internal ſurface away; till it is at laſt ſeen burſting its way into open light; and, in leſs than a quarter of an hour, the animal acquires its full perfection.

Thus, to uſe the words of Swammerdam, we ſee a little inſignificant creature diſtinguiſhed, in its laſt birth, with qualifications and ornaments, which man, during his ſtay upon earth, can never even hope to acquire. The butterfly, to enjoy life, needs no other food but the dews of Heaven, and the honeyed juices which are diſtilled from every flower. The pageantry of princes cannot equal the ornaments with which it is inveſted; nor the rich colouring that embelliſhes its wings. The ſkies are the butterfly's proper habitation, and the air its element: whilſt man comes into the world naked, and often roves about without habitation or ſhelter; expoſed on one hand, to the heat of the ſun; and, on the other, to the damps and exhalations of the earth; both alike enemies of his happineſs and exiſtence.—A ſtrong proof that, while this little animal is raiſed to its greateſt height, we are as yet, in this world, only candidates for perfection!

CHAP. III.

OF BUTTERFLIES AND MOTHS.

IT has been already ſhewn that all butterflies are bred from caterpillars; and we have exhibited the various circumſtances of that ſurpriſing change. It has been remarked, that butterflies may be eaſily diſtinguiſhed from flies of every other kind, by their wings; for, in others, they are either tranſparent, like gauze, as we ſee in the common fleſh fly; or they are hard and cruſted, as we ſee in the wings of the beetle. But in the butterfly, the wings are ſoft, opake, and painted over with a beautiful duſt, that comes off with handling.

The number of theſe beautiful animals is very great; and though Linnæus has reckoned up above ſeven hundred and ſixty different kinds, the catalogue is ſtill very incomplete. Every collector of butterflies can ſhew undeſcribed ſpecies: and ſuch as are fond of minute diſcovery, can here produce animals that have been examined only by himſelf. In general however, thoſe of the warm climates, are larger and more beautiful than ſuch as are bred at home; and we can eaſily admit the beauty of the butterfly, ſince we are thus freed from the damage of the caterpillar. It has been the amuſement of ſome to collect theſe animals, from different parts of the world; or to breed them from caterpillars at home. Theſe they arrange in ſyſtematic order, or diſpoſe ſo as to make ſtriking and agreeable pictures: and all muſt grant, that this ſpecious idleneſs is far preferable to that unhappy ſtate which is produced by a total want of employment.

The wings of butterflies, as was obſerved, fully diſtinguiſh them from flies of every other kind. They are four in number; and though two of them be cut off, the animal can fly with the two others remaining. They are, in their own ſubſtance, tranſparent; but owe their opacity to the beautiful duſt with which they are covered; and which has been likened by ſome naturaliſts, to the feathers of birds; by others to the ſcales of fiſhes; as their imaginations were diſpoſed to catch the reſemblance. In fact, if we regard the wing of a butterfly with a good microſcope, we ſhall perceive it ſtudded over with a variety of little grains of different dimenſions and forms, generally ſupported upon a footſtalk, regularly laid upon the whole ſurface. Nothing can exceed the beautiful and regular arrangement of theſe little ſubſtances; which thus ſerve to paint the butterfly's wing, like the tiles of a houſe. Thoſe of one rank are a little covered by thoſe that follow: they are of many figures: on one part of the wing may be ſeen a ſucceſſion of oval ſtuds; on another part, a cluſter of ſtuds, each in the form of a heart: in one place they reſemble a hand open: and in another they are long or triangular; while all are interſperſed with taller ſtuds, that grow between the reſt, like muſhrooms upon a ſtalk. The wing itſelf is compoſed of ſeveral thick nerves, which render the conſtruction very ſtrong, though light; and though it be covered over with thouſands of theſe ſcales or ſtuds, yet its weight is very little increaſed by the number. The animal is with eaſe enabled to ſupport itſelf a long while in air, although its flight be not very graceful. When it deſigns to fly to a conſiderable diſtance, it aſcends and deſcends alternately; going ſometimes to the right, ſometimes to the left, without any apparent reaſon. Upon cloſer examination, however, it will be found that it flies thus irregularly in purſuit of its mate; and as dogs bait and quarter the ground in purſuit of their game, ſo theſe inſects traverſe the air in queſt of their mates whom they can diſcover at more than a mile's diſtance.

If we proſecute our deſcription of the butterfly, the animal may be divided into three parts; the head, the corſelet, and the body.

The body is the hinder part of the butterfly, and is compoſed of rings, which are generally concealed under long hair, with which that part of the animal is clothed. The corſelet is more ſolid than the reſt of the body, becauſe the fore-wings and the legs are fixed therein. The legs are ſix in number, altho' four only are made uſe of by the animal; the two fore-legs being often ſo much concealed in the long hair of the body, that it is ſometimes difficult to diſcover them. If we examine theſe parts internally, we ſhall find the ſame ſet of veſſels in the butterfly that we obſerved in the caterpillar, but with this great difference, that as the blood or humours, in the caterpillar, circulated from the tail to the head, they are found in the butterfly to take a direct contrary courſe, and to circulate from the head to the tail; ſo that the caterpillar may be conſidered as the embryo animal, in which, as we have formerly ſeen, the circulation is carried on differently from what it is in animals when excluded.

But leaving the other parts of the butterfly, let us turn our attention particularly to the head. The eyes of butterflies have not all the ſame form; for in ſome they are large, in others ſmall; in ſome, they are the larger portion of a ſphere, in others they are but a ſmall part of it, and juſt appearing from the head. In all of them, however, the outward coat has a luſtre, in which may be diſcovered the various colours of the rainbow. When examined a little cloſely, it will be found to have the appearance of a multiplying-glaſs; having a great number of ſides or facets, in the manner of a brilliant cut diamond. In this particular, the eye of the butterfly, and of moſt other inſects, entirely correſpond; and Luenhoek pretends, there are above ſix thouſand facets on the cornea of a flea. Theſe, animals, therefore, ſee not only with great clearneſs; but view every object multiplied in a ſurpriſing manner. Puget adapted the cornea of a flea in ſuch a poſition, as to ſee objects through it by the means of a microſcope; and nothing could exceed the ſtrangeneſs of its repreſentations. A ſoldier, who was ſeen through it, appeared like an army of pigmies; for while it multiplied, it alſo diminiſhed the object; the arch of a bridge exhibited a ſpectacle more magnificent than human ſkill could perform; the flame of a candle ſeemed a beautiful illumination. It ſtill, however, remains a doubt, whether the inſect ſees objects ſingly, as with one eye; or whether every facet is itſelf a complete eye, exhibiting its own object diſtinct from all the reſt.

Butterflies, as well as moſt other flying inſects, have two inſtruments, like horns, on their heads, which are commonly called feelers. They differ from the horns of greater animals, in being moveable at their baſe; and in having a great number of joints, by which means the inſect is enabled to turn them in every direction. Thoſe of butterflies are placed at the top of the head, pretty near the external edge of each eye. What the uſe of theſe inſtruments may be, which are thus formed with ſo much art, and by a WORKMAN who does nothing without reaſon, is as yet unknown to man. They may ſerve to guard the eye; they may be of uſe to clean it; or they may be the organ of ſome ſenſe which we are ignorant of: but this is only explaining one difficulty by another. We are not ſo ignorant of the uſes of the trunk, which few inſects of the butterfly-kind are without. This inſtrument is placed exactly between the eyes; and when the animal is not employed in ſeeking its nouriſhment, it is rolled up like a curl. A butterfly, when it is feeding, flies round ſome flower, and ſettles upon it. The trunk is then uncurled, and thruſt out either wholly or in part; and is employed in ſearching the flower to its very bottom, let it be ever ſo deep. This ſearch being repeated ſeven or eight times, the butterfly then paſſes to another; and continues to hover over thoſe agreeable to its taſte, like a bird over its prey. This trunk conſiſts of two equal hollow tubes, nicely joined to each other, like the pipes of an organ.

Such is the figure and conformation of theſe beautiful inſects that cheer our walks, and give us the earlieſt intimations of ſummer. But it is not by day alone that they are ſeen fluttering wantonly from flower to flower, as the greateſt number of them fly by night, and expand the moſt beautiful colouring at thoſe hours when there is no ſpectator. This tribe of inſects has, therefore, been divided into Diurnal and Nocturnal Flies; or, more properly ſpeaking, into Butterflies and Moths: the one flying only by day, the other moſt uſually on the wing in the night. They may be eaſily diſtinguiſhed from each other, by their horns or feelers: thoſe of the butterfly being clubbed, or knobbed at the end; thoſe of the moth tapering finer and finer to a point. To expreſs it technically—the feelers of butterflies are clavated; thoſe of moths are filiform.

The butterflies, as well as the moths, employ the ſhort life aſſigned them, in a variety of enjoyments. Their whole time is ſpent either in queſt of food, which every flower offers; or in purſuit of the female whoſe approach they can often perceive at two miles diſtance. Their ſagacity in this particular is not leſs aſtoniſhing than true; but by what ſenſe they are thus capable of diſtinguiſhing each other at ſuch diſtances, is not eaſy to conceive. It cannot be by the ſight, ſince ſuch ſmall objects as they are muſt be utterly imperceptible at half the diſtance at which they perceive each other: it can ſcarcely be by the ſenſe of ſmelling, ſince the animal has no organs for that purpoſe. Whatever be their powers of perception, certain it is, that the male, after having fluttered, as if careleſsly, about for ſome time, is ſeen to take wing, and go forward, ſometimes for two miles together, in a direct line, to where the female is perched on a flower.

The general rule among inſects is, that the female is larger than the male; and this obtains particularly in the tribe I am deſcribing. The body of the male is ſmaller and ſlenderer; that of the female more thick and oval. Previous to the junction of theſe animals, they are ſeen ſporting in the air, purſuing and flying from each other, and preparing, by a mock combat, for the more important buſineſs of their lives. If they be diſturbed while united, the female flies off with the male on her back, who ſeems entirely paſſive upon the occaſion.

But the females of many moths and butterflies ſeem to have aſſumed their airy form for no other reaſon but to fecundate their eggs and lay them. They are not ſeen fluttering about in queſt of food or a mate: all that paſſes during their ſhort lives, is a junction with the male of about half an hour; after which they depoſit their eggs, and die, without taking any nouriſhment or ſeeking any. It may be obſerved, however, that in all the females of this tribe, they are impregnated by the male by one aperture and lay their eggs by another.

The eggs of female butterflies are diſpoſed in the body like a bed of chaplets; which, when excluded, are uſually oval, and of a whitiſh colour: ſome, however, are quite round; and others flatted, like a turnip. The covering, or ſhell of the egg, though ſolid, is thin and tranſparent; and in proportion as the caterpillar grows within the egg, the colours change, and are diſtributed differently. The butterfly ſeems very well inſtructed by nature in its choice of the plant, or the leaf, where it ſhall depoſit its burthen. Each egg contains but one caterpillar; and it is requiſite that this little animal, when excluded, ſhould be near its peculiar proviſion. The butterfly, therefore, is careful to place her brood only upon thoſe plants that afford good nouriſhment to its poſterity. Though the little winged animal has been fed itſelf upon dew, or the honey of flowers, yet it makes choice for its young of a very different proviſion, and lays its eggs on the moſt unſavoury plants; the rag-weed, the cabbage, or the nettle. Thus every butterfly chooſes not the plant moſt grateful to it in its winged ſtate; but ſuch as it has fed upon in its reptile form.

All the eggs of butterflies are attached to the leaves of the favourite plant, by a ſort of ſize or glue; where they continue, unobſerved, unleſs carefully ſought after. The eggs are ſometimes placed round the tender ſhoots of plants, in the form of bracelets, conſiſting of above two hundred in each, and generally ſurrounding the ſhoot, like a ring upon a finger. Some butterflies ſecure their eggs from the injuries of air, by covering them with hair, plucked from their own bodies, as birds ſometimes are ſeen to make their neſts; ſo that their eggs are thus kept warm, and alſo entirely concealed.

All the tribe of female moths lay their eggs a ſhort time after they leave the aurelia; but there are many butterflies that flutter about the whole ſummer, and do not think of laying, till the winter begins to warn them of their approaching end: ſome even continue the whole winter in the hollows of trees, and do not provide for poſterity until the beging of April, when they leave their retreats, depoſit their eggs, and die. Their eggs ſoon begin to feel the genial influence of the ſeaſon: the little animals burſt from them in their caterpillar ſtate, to become aurelias and butterflies in their turn; and thus to continue the round of Nature.

CHAP. IV.

OF THE ENEMIES OF THE CATERPILLAR.

NATURE, though it has rendered ſome animals ſurpriſingly fruitful, yet ever takes care to prevent their too great increaſe. One ſet of creatures is generally oppoſed to another: and thoſe are chiefly the moſt prolific that are, from their imbecility, incapable of making any effectual defence. The caterpillar has, perhaps, of all other animals, the greateſt number of enemies; and ſeems only to exiſt by its ſurpriſing fecundity. Some animals devour them by hundreds; others, more minute, yet more dangerous, mangle them in various ways: ſo that, how great ſoever their numbers may be, their deſtroyers are in equal proportion. Indeed, if we conſider the miſchiefs theſe reptiles are capable of occaſioning, and the various damages we ſuſtain from their inſatiable rapacity, it is happy for the other ranks of nature, that there are thouſands of fiſhes, birds, and even inſects, that live chiefly upon caterpillars, and make them their moſt favourite repaſt.

When we deſcribe the little birds that live in our gardens, and near our houſes, as deſtructive neighbours, ſufficient attention was not paid to the ſervices which they are frequently found to render us. It has been proved, that a ſingle ſparrow and its mate, that have young ones, deſtroy above three thouſand caterpillars in a week; not to mention ſeveral butterflies, in which numberleſs caterpillars are deſtroyed in embryo. It is in purſuit of theſe reptiles that we are favoured with the viſits of many of our moſt beautiful ſongſters; that amuſe us during their continuance, and leave us when the caterpillars diſappear.

The maxim which has often been urged againſt man, that he, of all other animals, is the only creature that is an enemy to his own kind, and that the human ſpecies only are found to deſtroy each other, has been adopted by perſons who never conſidered the hiſtory of inſects. Some of the caterpillar kind in particular, that ſeem fitted only to live upon leaves and plants, will, however, eat each other; and the ſtrongeſt will devour the weak, in preference to their vegetable food. That which lives upon the oak, is found to ſeize any of its companions, which it conveniently can, by the firſt rings, and inflict a deadly wound: it then feaſts in tranquillity on its prey, and leaves nothing of the animal but the huſk.

But it is not from each other they have the moſt to fear, as in general they are inoffenſive; and many of this tribe are found to live in a kind of ſociety. Many kind of flies lay their eggs either upon, or within their bodies; and as theſe turn into worms, the caterpillar is ſeen to nouriſh a ſet of inteſtine enemies within its body, that muſt ſhortly be its deſtruction: Nature having taught flies, as well as all other animals, the ſureſt methods of perpetuating their kind.— "Towards the end of Auguſt," ſays Reaumur, "I perceived a little fly, of a beautiful gold colour, buſily employed in the body of a large caterpillar, of that kind which feeds upon cabbage. I gently ſeparated that part of the leaf on which theſe inſects were placed, from the reſt of the plant, and placed it where I might obſerve them more at my eaſe. The fly, wholly taken up by the buſineſs in which it was employed, walked along the caterpillar's body, now and then remaining fixed to a particular ſpot. Upon this occaſion, I perceived it every now and then dart a ſting, which it carried at the end of its tail, into the caterpillar's body, and then drew it out again, to repeat the ſame operation in another place. It was not difficult for me to conjecture the buſineſs which engaged this animal ſo earneſtly; its whole aim was to depoſit its eggs in the caterpillar's body; which was to ſerve as a proper retreat for bringing them to perfection. The reptile thus rudely treated, ſeemed to bear all very patiently, only moving a little when ſtung too deeply; which, however, the fly ſeemed entirely to diſregard. I took particular care to feed this caterpillar; which ſeemed to me to continue as voracious and vigorous as any of the reſt of this kind. In about ten or twelve days, it changed into an aurelia, which ſeemed gradually to decline, and died: upon examining its internal parts, the animal was entirely devoured by worms; which, however, did not come to perfection, as it is probable they had not enough to ſuſtain them within."

What the French philoſopher perceived upon this occaſion, is every day to be ſeen in ſeveral of the larger kinds of caterpillars, whoſe bodies ſerve as a neſt to various flies, that very carefully depoſit their eggs within them. The large cabbage caterpillar is ſo ſubject to its injuries that, at certain ſeaſons, it is much eaſier to find them with than without them. The ichneumon fly, as it is called, particularly infeſts theſe reptiles, and prevents their fecundity. This fly is of all others, the moſt formidable to inſects of various kinds. The ſpider, that deſtroys the ant, the moth, and the butterfly, yet often falls a prey to the ichneumon; who purſues the robber to his retreat, and, deſpiſing his nets, tears him in pieces, in the very labyrinth he has made. This inſect, as redoubtable as the little quadruped that deſtroys the crocodile, has received the ſame name; and from its deſtruction of the caterpillar tribe, is probably more ſerviceable to mankind. This inſect, I ſay, makes the body of the caterpillar the place for depoſiting its eggs; to the number of ten, fifteen, or twenty. As they are laid in thoſe parts which are not mortal, the reptile ſtill continues to live, and to feed, ſhewing no ſigns of being incommoded by its new gueſts. The caterpillar changes its ſkin; and ſometimes undergoes the great change into an aurelia: but ſtill the fatal intruders work within, and ſecretly devour its internal ſubſtance: ſoon after they are ſeen burſting through its ſkin, and moving away, in order to ſpin themſelves a covering, previous to their own little transformation. It is indeed aſtoniſhing ſometimes to ſee the number of worms, and thoſe pretty large, that thus iſſue from the body of a ſingle caterpillar, and eat their way through its ſkin: but it is more extraordinary ſtill, that they ſhould remain within the body, devouring its entrails, without deſtroying its life. The truth is, they ſeem inſtructed by Nature not to devour its vital parts;

for they are found to feed only upon that fatty ſubſtance which compoſes the largeſt part of the caterpillar's body. When this ſurpriſing appearance was firſt obſerved, it was ſuppoſed that the animal thus gave birth to a number of flies, different from itſelf; and that the ſame caterpillar ſometimes bred an ichneumon, and ſometimes a butterfly: but it was not till after more careful inſpection it was diſcovered, that the ichneumon tribe were not the caterpillar's offspring, but its murderers.

CHAP. V.

OF THE SILKWORM.

HAVING mentioned, in the laſt chapter, the damages inflicted by the caterpillar tribe, we now come to an animal of this kind, that alone compenſates for all the miſchief occaſioned by the reſt. This little creature, which only works for itſelf, has been made of the utmoſt ſervice to man; and furniſhes him with a covering more beautiful than any other animal can ſupply. We may declaim indeed againſt the luxuries of the times, when ſilk is ſo generally worn; but were ſuch garments to fail, what other arts could ſupply their deficiency?

Though ſilk was anciently brought in ſmall quantities to Rome, yet it was ſo ſcarce as to be ſold for its wight in gold; and was conſidered as ſuch a luxurious refinement in dreſs, that it was infamous for a man to appear in habits of which ſilk formed but half the compoſition. It was moſt probably brought among them from the remoteſt parts of the Eaſt; ſince it was, at the time of which I am ſpeaking, ſcarcely known even in Perſia.

Nothing can be more remote from the truth, than the manner in which their hiſtorians deſcribe the animal by which ſilk is produced. Pauſanius informs us, that ſilk came from the country of the Seres, a people of Aſiatic Scythia; in which place an inſect, as large as the beetle, but in every other reſpect reſembling a ſpider, was bred up for that purpoſe. They take great care, as he aſſures us, to feed and defend it from the weather; as well during the ſummer's heat, as the rigours of winter. This inſect, he obſerves, makes its web with its feet, of which it has eight in number. It is fed for the ſpace of four years upon a kind of paſte, prepared for it; and at the beginning of the fifth, it is ſupplied with the leaves of the green willow, of which it is particularly fond. It then feeds till it burſts with fat; after which they take out its bowels, which are ſpun into the beautiful manufacture ſo ſcarce and coſtly.

The real hiſtory of this animal was unknown among the Romans till the times of Juſtinian; and it is ſuppoſed, that ſilkworms were not brought into Europe till the beginning of the twelfth century; when Roger of Sicily brought workmen in this manufacture from Aſia Minor, after his return from his expedition to the Holy Land, and ſettled them in Sicily and Calabria. From theſe the other kingdoms of Europe learned this manufacture; and it is now one of the moſt lucrative carried on among the ſouthern provinces of Europe.

The ſilkworm is now very well known to be a large caterpillar, of a whitiſh colour, with twelve feet, and producing a butterfly of the moth kind. The cone on which it ſpins, is formed for covering it while it continues in the aurelia ſtate; and ſeveral of theſe, properly wound off, and united together, form thoſe ſtrong and beautiful threads, which are woven into ſilk. The feeding theſe worms, the gathering, the winding, the twiſting, and the weaving their ſilk, is one of the principal manufactures of Europe; and, as our luxuries increaſe, ſeems every day to become more and more neceſſary to human happineſs.

There are two methods of breeding ſilkworms; for they may be left to grow, and to remain at liberty upon the trees where they are hatched; or they may be kept in a place built for that purpoſe, and fed every day with freſh leaves. The firſt method is uſed in China, Tonquin, and other hot countries; the other is uſed in thoſe places where the animal has been artificially propagated, and ſtill continues a ſtranger. In the warm climates, the ſilkworm proceeds from an egg, which has been glued by the parent moth upon proper parts of the mulberry-tree, and which remains in that ſituation during the winter. The manner in which they are ſituated and fixed to the tree, keeps them unaffected by the influence of the weather; ſo that thoſe froſts which are ſevere enough to kill the tree, have no power to injure the ſilk-worm.

The inſect never proceeds from the egg till Nature has provided it a ſufficient ſupply; and till the budding leaves are furniſhed, in ſufficient abundance, for its ſupport. When the leaves are put forth, the worms ſeem to feel the genial ſummons, and burſting from their little eggs, crawl upon the leaves, where they feed with a moſt voracious appetite. Thus they become larger by degrees; and after ſome months feeding, they lay, upon every leaf, ſmall bundles, or cones of ſilk, which appear like ſo many golden apples, painted on a fine green ground. Such is the method of breeding them in the Eaſt; and without doubt it is beſt for the worms, and leaſt troubleſome for the feeder of them. But it is otherwiſe in our colder European climates; the frequent changes of the weather, and the heavy dews of our evenings, render the keeping them all night expoſed, ſubject to ſo many inconveniences, as to admit of no remedy. It is true, that by the aſſiſtance of nets, they may be preſerved from the inſults of birds; but the ſevere cold weather, which often ſucceeds the firſt heats of ſummer, as well as the rain and high winds, will deſtroy them all: and, therefore, to breed them in Europe, they muſt be ſheltered and protected from every external injury.

For this purpoſe, a room is choſen, with a ſouth aſpect; and the windows are ſo well glazed, as not to admit the leaſt air: the walls are well built, and the planks of the floor exceedingly cloſe, ſo as to admit neither birds nor mice, nor even ſo much as an inſect. In the middle there ſhould be four pillars erected, or four wooden poſts, ſo placed as to form a pretty large ſquare. Between theſe are different ſtories made with oſier hurdles; and under each hurdle there ſhould be a floor, with an upright border all round. Theſe hurdles and floors muſt hang upon pullies, ſo as to be placed or taken down at pleaſure.

When the worms are hatched, ſome tender mulberry leaves are provided, and placed in the cloth or paper-box in which the eggs were laid, and which are large enough to hold a great number. When they have acquired ſome ſtrength, they muſt be diſtributed on beds of mulberry leaves, in the different ſtories of the ſquare in the middle of the room, round which a perſon may freely paſs on every ſide. They will fix themſelves to the leaves, and afterwards to the ſticks of the hurdles, when the leaves are devoured. They have then a thread, by which they can ſuſpend themſelves on occaſion, to prevent any ſhock by a fall; but this is by no means to be conſidered, as the ſilk which they ſpin afterwards in ſuch abundance. Care muſt be taken that freſh leaves be brought every morning, which muſt be ſtrewed very gently and equally over them; upon which the ſilkworms will forſake the remainder of the old leaves, which muſt be carefully taken away, and every thing kept very clean; for nothing hurts theſe inſects ſo much as moiſture and uncleanlineſs. For this reaſon their leaves muſt be gathered when the weather is dry, and kept in a dry place, if it be neceſſary to lay in a ſtore. As theſe animals have but a ſhort time to live, they make uſe of every moment, and almoſt continually are ſpinning, except at thoſe intervals when they change their ſkins. If mulberry leaves be difficult to be obtained, the leaves of lettuce or holyoak will ſuſtain them: but they do not thrive ſo well upon their new diet; and their ſilk will neither be ſo copious, nor of ſo good a quality.

Though the judicious choice, and careful management of their diet, is abſolutely neceſſary, yet there is another precaution of equal importance, which is to give them air, and open their chamber windows, at ſuch times as the ſun ſhines warmeſt. The place alſo muſt be kept as clean as poſſible; not only the ſeveral floors that are laid to receive their ordure, but the whole apartments in general. Theſe things well obſerved, contribute greatly to their health and increaſe.

The worm, at the time it burſts the ſhell, is extremely ſmall, and of a black colour; but the head is of a more ſhining black than the reſt of the body: ſome days after, they begin to turn whitiſh, or of an aſh-coloured grey.—After the ſkin begins to grow too rigid, or the animal is ſtinted within it, the inſect throws it off, and appears clothed anew: it then becomes larger and much whiter, though it has a greeniſh caſt: after ſome days, which are more or leſs, according to the different heat of the climate, or to the quality of the food, it leaves off eating, and ſeems to ſleep for two days together: then it begins to ſtir, and put itſelf into violent motions, till the ſkin falls off the ſecond time, and is thrown aſide by the animal's feet. All theſe changes are made in three weeks or a month's time; after which it begins to feed once more, ſtill in its caterpillar form, but a good deal differing from itſelf before its change. In a few days time it ſeems to ſleep again; and, when it awakes, it again changes its clothing, and continues feeding as before. When it has thus taken a ſufficiency of food, and its parts are diſpoſed for aſſuming the aurelia form, the animal forſakes, for the laſt time, all food and ſociety, and prepares itſelf a retreat to defend it from external injuries, while it is ſeemingly deprived of life and motion.

This retreat is no other than its cone, or ball of ſilk, which Nature has taught it to compoſe with great art; and within which it buries itſelf, till it aſſumes its winged form. This cone or ball is ſpun from two little longiſh kinds of bags that lie above the inteſtines, and are filled with a gummy fluid, of a marigold colour. This is the ſubſtance of which the threads are formed; and the little animal is furniſhed with a ſurpriſing apparatus for ſpinning it to the degree of fineneſs which its occaſions may require. This inſtrument in ſome meaſure reſembles a wire-drawer's machine, in which gold or ſilver threads are drawn to any degree of minuteneſs; and through this the animal draws its thread with great aſſiduity. As every thread proceeds from two gum bags, it is probable that each ſupplies its own; which, however, are united, as they proceed from the animal's body. If we examine the thread with a microſcope, it will be found that it is flatted on one ſide, and grooved along its length: from hence we may infer, that it is doubled juſt upon leaving the body; and that the two threads ſtick to each other by that gummy quality of which they are poſſeſſed. Previous to ſpinning its web, the ſilkworm ſeeks out ſome convenient place to erect its cell, without any obſtruction. When it has found a leaf, or a chink fitted to its purpoſe, it begins to wreathe its head in every direction, and faſtens its thread on every ſide to the ſides of its retreat. Though all its firſt eſſays ſeem perfectly confuſed, yet they are not altogether without deſign: there appears indeed, no order or contrivance in the diſpoſal of its firſt threads; they are by no means laid artfully over each other, but are thrown out at random, to ſerve as an external ſhelter againſt rain; for Nature having appointed the animal to work upon trees in the open air, its habits remain, though it is brought up in a warm apartment.

Malpighi pretends to have obſerved ſix different layers in a ſingle cone of ſilk: but what may eaſily be obſerved is, that it is compoſed externally of a kind of rough cotton-like ſubſtance, which is called floſs; within the thread is more diſtinct and even; and next the body of the aurelia, the apartment ſeems lined with a ſubſtance of the hardneſs of paper, but of a much ſtronger conſiſtence. It muſt not be ſuppoſed, that the thread which goes to compoſe the cone, is rolled round, as we roll a bottom; on the contrary, it lies upon it in a very irregular manner, and winds off now from one ſide of the cone, and then from the other. This whole thread, if meaſured, will be found about three hundred yards long; and ſo very fine, that eight or ten of them are generally rolled off into one by the manfacturers. The cone, when completed, is in form like a pigeon's egg, and more pointed at one end than the other; at the ſmaller end, the head of the aurelia is generally found; and this is the place that the inſect, when converted into a moth, is generally ſeen to burſt through.

It is generally a fortnight or three weeks before the aurelia is changed into a moth; but no ſooner is the winged inſect completely formed, than having diveſted itſelf of its aurelia ſkin, it prepares to burſt through its cone, or outward priſon: for this purpoſe it extends its head towards the point of the cone, butts with its eyes, which are rough, againſt the lining of its cell, wears it away, and at laſt puſhes forward, through a paſſage which is ſmall at firſt, but which enlarges as the animal increaſes its efforts for emancipation; while the tattered remnants of its aurelia ſkin lie in confuſion within the cone, like a bundle of dirty linen.

The animal, when thus ſet free from its double confinement, appears exhauſted with fatigue, and ſeems produced for no other purpoſe but to tranſmit a future brood. It neither flies nor eats; the male only ſeeking the female, whoſe eggs he impregnates; and their union continues for four days, without interruption. The male dies immediately after ſeparation from his mate; and ſhe ſurvives him only till ſhe has laid her eggs, which are not hatched into worms till the enſuing ſpring.

However, there are few of theſe animals ſuffered to come to a ſtate of maturity; for as their burſting through the cone deſtroys the ſilk, the manufacturers take care to kill the aurelia, by expoſing it to the ſun, before the moth comes to perfection. This done, they take off the floſs, and throw the cones into warm water, ſtirring them till the firſt thread offers them a clue for winding all off. They generally take eight of the ſilken threads together: the cones ſtill kept under water, till a proper quantity of the ſilk is wound off: however, they do not take all; for the latter parts grow weak, and are of a bad colour. As to the paper-like ſubſtance which remains, ſome ſtain it with a variety of colours, to make artifical flowers, others let it lie in the water, till the glutinous matter which cements it is all diſſolved: it is then carded like wool, ſpun with a wheel, and converted into ſilk ſtuffs of an inferior kind.

BOOK IV.

INSECTS OF THE FOURTH ORDER.

CHAP. I.

OF THE FOURTH ORDER OF INSECTS IN GENERAL.

IN the foregoing part we treated of caterpillars changing into butterflies; in the preſent will be given the hiſtory of grubs changing into their correſponding winged animals. Theſe, like the former, undergo their transformation, and appear as grubs or maggots, as aurelias, and at laſt as winged inſects. Like the former, they are bred from eggs; they feed in their reptile ſtate; they continue motionleſs and lifeleſs, as aurelias: and fly and propagate, when furniſhed with wings. But they differ in many reſpects: the grub or maggot wants the number of feet which the caterpillar is ſeen to have; the aurelia is not ſo totally wrapped up, but that its feet and its wings appear. The perfect animal, when emancipated, alſo has its wings either caſed, or tranſparent, like gauze; not coloured with that beautifully painted duſt which adorns the wings of the butterfly.

In this claſs of inſects, therefore, we may place a various tribe, that are firſt laid as eggs, then are excluded as maggots or grubs, then change into aurelias, with their legs and wings not wrapped up, but appearing; and laſtly, aſſuming wings, in which ſtate they propagate their kind. Some of theſe have four tranſparent wings, as bees; ſome have two membranous caſes to their wings, as beetles; and ſome have but two wings, which are tranſparent, as ants. Here, therefore, we will place the bee, the waſp, the humble bee, the ichneumon fly, the gnat, the tipula or longlegs, the beetle, the may-bug, the glow-worm, and the ant. The transformations which all theſe undergo, are pretty nearly ſimilar; and though very different animals in form, are yet produced nearly in the ſame manner.

CHAP. II.

OF THE BEE.

TO give a complete hiſtory of this inſect in a few pages, which ſome have exhauſted volumes in deſcribing, and whoſe nature and properties ſtill continue in diſpute, is impoſſible. It will be ſufficient to give a general idea of the animal's operations; which, though they have been ſtudied for more than two thouſand years, are ſtill but incompletely known. The account given us by Reaumur is ſufficiently minute; and, if true, ſufficiently wonderful: but I find many of the facts which he relates doubted by thoſe who are moſt converſant with bees; and ſome of them actually declared not to have a real exiſtence in Nature.

It is unhappy, therefore, for thoſe whoſe method demands a hiſtory of bees, that they are unfurniſhed with thoſe materials which have induced ſo many obſervers to contradict ſo great a naturaliſt. His life was ſpent in the contemplation; and it requires an equal ſhare of attention, to prove the error of his diſcoveries. Without entering, therefore, into the diſpute, I will take him for my guide; and juſt mention, as I go along, thoſe particulars in which ſucceeding obſervers have begun to think him erroneous. Which of the two are right, time can only diſcover; for my part, I have only heard one ſide, for as yet none have been ſo bold, as openly to oppoſe Reaumur's delightful reſearches.

There are three different kinds of bees in every hive. Firſt, the labouring bees, which make up the far greateſt number, and are thought to be neither male nor female, but merely born for the purpoſes of labour, and continuing the breed, by ſupplying the young with proviſion, while yet in their helpleſs ſtate. The ſecond ſort are the drones; they are of a darker colour, longer, and more thick by one third than the former; they are ſuppoſed to be the males; and there is not above a hundred of them in a hive of ſeven or eight thouſand bees. The third ſort is much larger than either of the former, and ſtill fewer in number: ſome aſſert that there is not above one in every ſwarm: but this later obſervers affirm not to be true, there being ſometimes five or ſix in the ſame hive. Theſe are called queen bees, and are ſaid to lay all the eggs from which the whole ſwarm is hatched in a ſeaſon.

In examining the ſtructure of the common working bee, the firſt remarkable part that offers is the trunk, which ſerves to extract the honey from flowers. It is not formed like that of other flies, in the manner of a tube, by which the fluid is to be ſucked up; but like a beſom, to ſweep, or a tongue, to lick it away. The animal is furniſhed alſo with teeth, which ſerve it in making wax. This ſubſtance is gathered from flowers, like honey; it conſiſts of that duſt or farina which contributes to the fecundation of plants, and is moulded into wax by the little animal at leiſure. Every bee when it leaves the hive to collect this precious ſtore, enters into the cup of the flower, particularly ſuch as ſeem charged with the greateſt quantity of this yellow farina. As the animal's body is covered over with hair, it rolls itſelf within the flower and ſoon becomes quite covered with the duſt, which it ſoon after bruſhes off with its two hind-legs, and kneads into two little balls. In the thighs of the hind-legs there are two cavities, edged with hair, and into theſe, as into a baſket, the animal ſticks its pellets. Thus employed, the bee flies from flower to flower, increaſing its ſtore, and adding to its ſtock of wax; until the ball upon each thigh, becomes as big as a grain of pepper: by this time, having got a ſufficient load, it returns, making the beſt of its way to the hive.

The belly of the bee is divided into ſix rings, which ſometimes ſhorten the body, by ſlipping one over the other. It contains within it, beſide the inteſtines, the honey-bag, the venom-bag, and the ſting. The honey-bag is as tranſparent as cryſtal, containing the honey that the bee has bruſhed from the flowers; of which the greateſt part is carried to the hive, and poured into the cells of the honey-comb; while the remainder ſerves for the bee's own nouriſhment: for, during ſummer, it never touches what has been laid up for the winter. The ſting, which ſerves to defend this little animal from its enemies, is compoſed of three parts; the ſheath and two darts, which are extremely ſmall and penetrating. Both the darts have ſeveral ſmall points or barbs, like thoſe of a fiſh-hook, which render the ſting more painful, and makes the darts rankle in the wound. Still, however, this inſtrument would be very ſlight, did not the bee poiſon the wound. The ſheath, which has a ſharp point, makes the firſt impreſſion; which is followed by that of the darts, and then the venomous liquor is poured in. The ſheath ſometimes ſticks ſo faſt in the wound, that the animal is obliged to leave it behind; by which the bee ſoon after dies, and the wound is conſiderably inflamed. It might at firſt appear well for mankind, if the bee were without its ſting; but upon recollection, it will be found, that the little animal would have then too many rivals in ſharing its labours. A hundred other lazy animals, fond of honey, and hating labour, would intrude upon the ſweets of the hive; and the treaſure would be carried off for want of armed guardians to protect it.

From examining the bee ſingly, we now come to conſider it in ſociety, as an animal not only ſubject to laws, but active, vigilant, laborious and diſintereſted. All its proviſions are laid up for the community; and all its arts in building a cell deſigned for the benefit of poſterity. The ſubſtance with which bees build their cells is wax; which is faſhioned into convenient apartments for themſelves and their young. When they begin to work in their hives, they divide themſelves into four companies: one of which roves in the fields in ſearch of materials; another employs itſelf in laying out the bottoms and partitions of their cells; a third is employed in making the inſide ſmooth from the corners and angles; and the fourth company bring food for the reſt, or relieve thoſe who return with their reſpective burthens. But they are not kept conſtant to one employment; they often change the taſks aſſigned them; thoſe that have been at work, being permitted to go abroad; and thoſe that have been in the fields already take their places. They ſeem even to have ſigns, by which they underſtand each other; for when any of them wants food, it bends down its trunk to the bee from whom it is expected, which then opens its honey-bag, and lets ſome drops fall into the other's mouth, which is at that time opened to receive it. Their diligence and labour is ſo great, that in a day's time they are able to make cells which lie upon each other, numerous enough to contain three thouſand bees.

If we examine their cells, they will be found formed in the exacteſt proportion. It was ſaid by Pappus, an ancient geometrician, that, of all other figures, hexagons were the moſt convenient; for when placed touching each other, the moſt convenient room would be given, and the ſmalleſt loſt. The cells of the bees are perfect hexagons: theſe, in a every honeycomb, are double, opening on either ſide, and cloſed at the bottom. The bottoms are compoſed of little triangular panes, which, when united together, terminate in a point, and lie exactly upon the extremities of other panes of the ſame ſhape, in oppoſite cells. Theſe lodgings have ſpaces, like ſtreets, between them, large enough to give the bees a free paſſage in and out; and yet narrow enough to preſerve the neceſſary heat. The mouth of every cell is defended by a border, which makes the door a little leſs than the inſide of the cell, which ſerves to ſtrengthen the whole. Theſe cells ſerve for different purpoſes: for laying up their young; for their wax, which in winter becomes a part of their food; and for their honey, which makes their principal ſubſiſtence.

It is well known that the habitation of bees ought to be very cloſe; and what their hives want, from the negligence or unſkilfulneſs of man, theſe animals ſupply by their own induſtry: ſo that it is their principal care, when firſt hived, to ſtop up all the crannies. For this purpoſe they make uſe of a reſinous gum, which is more tenacious than wax, and differs greatly from it. This the ancients called *propolis*: it will grow conſiderably hard in June; though it will in ſome meaſure ſoften by heat; and is often found different in conſiſtence, colour, and ſmell. It has generally an agreeable aromatic odour when it is warmed; and by ſome it is conſidered as a moſt grateful perfume. When the bees begin to work with it, it is ſoft, but it acquires a firmer conſiſtence every day; till at length it aſſumes a brown colour, and becomes much harder than wax. The bees carry it on their hinder legs; and ſome think it is met with on the birch, the willow, and poplar. However it is procured, it is certain that they plaiſter the inſide of their hives with this compoſition.

If examined through a glaſs hive, from the hurry the whole ſwarm is in, the whole appears at firſt like anarchy and confuſion: but the ſpectator ſoon finds every animal diligently employed, and following one purſuit, with a ſettled purpoſe. Their teeth are the inſtruments by which they model and faſhion their various buildings, and give them ſuch ſymmetry and perfection. They begin at the top of the hive; and ſeveral of them work at a time, at the cells which have two faces. If they are ſtinted with regard to time, they give the new cells but half the depth which they ought to have; leaving them imperfect, till they have ſketched out the number of cells neceſſary for the preſent occaſion. The conſtruction of their combs, coſts them a great deal of labour: they are made by inſenſible additions; and not caſt at once in a mould, as ſome are apt to imagine. There ſeems no end of their ſhaping, finiſhing, and turning them neatly up. The cells for their young are moſt carefully formed; thoſe deſigned for lodging the drones, are larger than the reſt; and that for the queen-bee, the largeſt of all. The cells in which the young brood are lodged, ſerve at different times for containing honey; and this proceeds from an obvious cauſe: every worm, before it is transformed into an aurelia, hangs its old ſkin on the partitions of its cell; and thus, while it ſtrengthens the wall, diminiſhes the capacity of its late apartment. The ſame cell, in a ſingle ſummer, is often tenanted by three or four worms in ſucceſſion; and the next ſeaſon, by three or four more. Each worm takes particular care to fortify the pannels of its cell, by hanging up its ſpoils there: thus, the partitions being lined, ſix or eight deep, become at laſt too narrow for a new brood, and are converted into ſtore-houſes, for honey.

Thoſe cells where nothing but honey is depoſited, are much deeper than the reſt. When the harveſt of honey is ſo plentiful that they have not ſufficient room for it, they either lengthen their combs, or build more; which are much longer than the former. Sometimes they work at three combs at a time; for when there are three work-houſes, more bees may be thus employed, without embarraſſing each other.

But honey, as was before obſerved, is not the only food upon which theſe animals ſubſiſt. The meal of flowers, of which their wax is formed, is one of their moſt favourite repaſts. This is a diet which they live upon during the ſummer; and of which they lay up a large winter proviſion, The wax of which their combs are made, is no more than this meal digeſted, and wrought into a paſte. When the flowers upon which bees generally feed, are not fully blown, and this meal or duſt is not offered in ſufficient quantities, the bees pinch the tops of the ſtamina in which it is contained, with their teeth; and thus anticipate the progreſs of vegetation. In April and May, the bees are buſy, from morning to evening, in gathering this meal; but when the weather becomes too hot in the midſt of ſummer, they work only in the morning.

The bee is furniſhed with a ſtomach for its wax, as well as it honey. In the former of the two, their powder is altered, digeſted, and concocted into real wax; and is thus ejected by the ſame paſſage by which it was ſwallowed. Every comb, newly made, is white: but it becomes yellow as it grows old, and almoſt black when kept too long in the hive. Beſide the wax thus digeſted, there is a large portion of the powder kneaded up for food in every hive, and kept in ſeparate cells, for winter proviſion. This is called, by the country people, bee-breed; and contributes to the health and ſtrength of the animal during the winter. Thoſe who rear bees, may rob them of their honey, and feed them, during the winter, with treacle; but no proper ſubſtitute has yet been found for the bee-bread; and, without it, the animals become conſumptive and die.

As for the honey, it is extracted from that part of the flower called the nectareum. From the mouth this delicious fluid paſſes into the gullet; and then into the firſt ſtomach, or honey-bag, which, when filled, appears like an oblong bladder. Children, that live in country places, are well acquainted with this bladder; and deſtroy many bees to come at their ſtore of honey. When a bee has ſufficiently filled its firſt ſtomach, it returns back to the hive, where it diſgorges the honey into one of the cells. It often happens the bee delivers its ſtore to ſome other, at the mouth of the hive, and flies off for a freſh ſupply. Some honey-combs are always left open for common uſe; but many others are ſtopped up, till there is a neceſſity of opening them. Each of theſe are covered carefully with wax; ſo cloſe, that the covers ſeem to be made at the very inſtant the fluid is depoſited within them.

Having thus given a curſory deſcription of the inſect, individually conſidered, and of the habitation it forms, we next come to its ſocial habits and inſtitutions: and, in conſidering this little animal attentively, after the neceſſary precautions for the immediate preſervation of the community, its ſecond care is turned to the continuance of poſterity. How numerous ſoever the multitude of bees may appear in one ſwarm, yet they all owe their original to a ſingle parent, which is called the *Queen-Bee.* It is indeed ſupriſing that a ſingle inſect ſhall, in one ſummer, give birth to above twenty thouſand young: but, upon opening her body, the wonder will ceaſe; as the number of eggs appearing, at one time, amounts to five thouſand. This animal, whoſe exiſtence is of ſuch importance to her ſubjects, may eaſily be diſtinguiſhed from the reſt, by her ſize, and the ſhape of her body. On her ſafety depends the whole welfare of the commonwealth; and the attentions paid her by all the reſt of the ſwarm, evidently ſhew the dependence her ſubjects have upon her ſecurity. If this inſect be carefully obſerved, ſhe will be ſeen at times attended with a numerous retinue, marching from cell to cell, plunging the extremity of her body into many of them, and leaving a ſmall egg in each.

The bees which generally compoſe her train, are thought to be males, which ſerve to impregnate her by turns. Theſe are larger and blacker than the common bees; without ſtings, and without induſtry. They ſeem formed only to tranſmit a poſterity; and to attend the queen, whenever ſhe thinks proper to iſſue from the ſecret retreats of the hive, where ſhe moſt uſually reſides. Upon the union of theſe two kinds depends all expectations of a future progeny; for the working bees are of no ſex, and only labour for another offspring: yet ſuch is their attention to their queen, that if ſhe happens to die, they will leave off working, and take no farther care of poſterity. If, however, another queen is in this ſtate of univerſal deſpair preſented them, they immediately acknowledge her for ſovereign, and once more diligently apply to their labour. It muſt be obſerved, however, that all this fertility of the queen-bee, and the great attentions paid to her by the reſt, are controverted by more recent obſervers. They aſſert, that the common bees are parents themſelves; that they depoſit their eggs in the cells which they have prepared;

that the females are impregnated, by the males, and bring forth a progeny, which is wholly their own.

However, to go on with their hiſtory, as delivered us by Mr. Reaumur—When the queen-bee has depoſited the number of eggs neceſſary in the cells, the working bees undertake the care of the riſing poſterity. They are ſeen to leave off their uſual employments; to conſtruct proper receptacles for eggs; or to complete thoſe that are already formed. They purpoſely build little cells, extremely ſolid, for the young; in which they employ a great deal of wax: thoſe deſigned for lodging the males, as was already obſerved, are larger than the reſt; and thoſe for the queen-bees the largeſt of all. There is uſually but one egg depoſited in every cell; but when the fecundity of the queen is ſuch, that it exceeds the number of cells already prepared, there are ſometimes three or four eggs crowded together in the ſame apartment. But this is an inconvenience that the working bees will by no means ſuffer. They ſeem ſenſible that, two young ones, ſtuffed up in the ſame cell, when they grow larger, will but embarraſs, and at laſt deſtroy each other: they therefore take care to leave a cell to every egg; and remove, or deſtroy the reſt.

The ſingle egg that is left remaining, is fixed to the bottom of the cell, and touches it but in a ſingle point. A day or two after it is depoſited, the worm is excluded from the ſhell of the egg, having the appearance of a maggot rolled up in a ring, and lying ſoftly on a bed of a whiteſt coloured jelly; upon which alſo the little animal begins to feed. In the mean time, the inſtant it appears, the working bees attend it with the moſt anxious and parental tenderneſs; they furniſh it every hour with a ſupply of this whitiſh ſubſtance, on which it feeds and lies; and watch the cell with unremitting care. They are nurſes that have greater affection for the offspring of others, than many parents have for their own children. They are conſtant in viſiting each cell, and ſeeing that nothing is wanting; preparing the white mixture, which is nothing but a compoſition of honey and wax, in their own bowels, with which they feed them. Thus attended, and plentifully fed, the worm, in leſs than ſix days time, comes to its full growth, and no longer accepts the food offered it. When the bees perceive that it has no further occaſion for feeding, they perform the laſt offices of tenderneſs, and ſhut the little animal up in its cell; walling up the mouth of its apartment with wax: there they leave the worm to itſelf; having ſecured it from every external injury.

The worm is no ſooner left incloſed, but, from a ſtate of inaction, it begins to labour, extending and ſhortening its body; and by this means lining the walls of its apartment with a ſilken tapeſtry, which it ſpins in the manner of caterpillars, before they undergo their laſt transformation. When their cell is thus prepared, the animal is ſoon after transformed into an aurelia; but differing from that of the common caterpillar, as it exhibits not only the legs, but the wings of the future bee, in its preſent ſtate of inactivity. Thus, in about twenty, or one and twenty days after the egg was laid, the bee is completely formed, and fitted to undergo the fatigues of its ſtate. When all its parts have acquired their proper ſtrength and conſiſtence, the young animal opens its priſon, by piercing with its teeth the waxen door that confines it. When juſt freed from its cell, it is as yet moiſt, and incommoded with the ſpoils of its former ſituation; but the officious bees are ſoon ſeen to flock round it, and to lick it clean on all ſides with their trunks; while another band, with equal aſſiduity, are obſerved to feed it with honey: others again begin immediately to cleanſe the cell that has been juſt left; to carry the ordures out of the hive, and to fit the place for a new inhabitant. The young bee ſoon repays their care, by its induſtry; for as ſoon as ever its external parts become dry, it diſcovers its natural appetites for labour, and induſtriouſly begins the taſk, which it purſues unremittingly through life. The toil of man is irkſome to him, and he earns his ſubſiſtence with pain; but this little animal ſeems happy in its purſuit, and finds delight in all its employment.

When juſt freed from the cell, and properly equipped by its fellow bees for duty, it at once iſſues from the hive, and inſtructed only by Nature, goes in queſt of flowers, chooſes only thoſe that yield it a ſupply, rejects ſuch as are barren of honey, or have been already drained by other adventurers; and when loaded, is never at a loſs to find its way back to the common habitation. After this firſt ſally, it begins to gather the mealy powder, that lies on every flower, which is afterwards converted into wax; and with this, the very firſt day, it returns with two large balls ſtuck to its thighs.

When bees firſt begin to break their priſons, they are generally above a hundred excluded in one day. Thus, in the ſpace of a few weeks, the number of the inhabitants in one hive, of moderate ſize, becomes ſo great, that there is no place to contain the new comers; and they are ſcarcely excluded from the cell, when they are obliged, by the old bees, to ſally forth in queſt of new habitations. In other words, the hive begins to ſwarm, and the new progeny prepares for exile.

While there is room enough in the hive, the bees remain quietly together; it is neceſſity alone that compels the ſeparation. Sometimes, indeed, the young brood, with graceleſs obſtinacy, refuſe to depart, and even venture to reſiſt their progenitors. The young ones are known by being browner than the old, with whiter hair; the old ones are of a lighter colour, with red hair. The two armies are therefore eaſily diſtinguiſhable, and dreadful battles are often ſeen to enſue. But the victory almoſt ever terminates with ſtrict poetical juſtice in favour of the veterans, and the rebellious offspring are driven off, not without loſs and mutilation.

In different countries, the ſwarms make their appearance at different times of the year, and there are ſeveral ſigns previous to this intended migration. The night before, an unuſual buzzing is heard in the hive; in the morning, though the weather be ſoft and inviting, they ſeem not to obey the call, being intent on more important meditations within. All labour is diſcontinued in the hive, every bee is either employed in forcing, or reluctantly yielding a ſubmiſſion; at length, after ſome noiſe and tumult, a queen bee is choſen to guard rather than conduct the young colony to other habitations, and then they are marſhalled without any apparent conductor. In leſs than a minute they leave their native abode, and forming a cloud round their protectreſs, they ſet off, without ſeeming to know the place of their deſtination; *The world before them, where to chooſe their place of reſt.* The uſual time of ſwarming is from ten in the morning to three in the afternoon, when the ſun ſhines bright, and invites them to ſeek their fortunes. They flutter for a while in the air, like flakes of ſnow, and ſometimes undertake a diſtant journey, but more frequently are contented with ſome neighbouring aſylum; the branch of a tree, a chimney-top, or ſome other expoſed ſituation. It is, indeed, remarkable, that all theſe animals, of whatever kind, that have long been under the protection of man, ſeem to loſe a part of their natural ſagacity, in providing for themſelves. The rabbit, when domeſticated, forgets to dig holes, the hen to build a neſt, and the bee to ſeek a ſhelter, that ſhall protect it from the inclemencies of winter. In thoſe countries, where the bees are wild, and unprotected by man, they are always ſure to build their waxen cells in the hollow of a tree; but with us, they ſeem improvident in their choice, and the firſt green branch that ſtops their flight, ſeems to be thought ſufficient for their abode through winter. However, it does not appear, that the queen chooſes the place where they are to alight, for many of the ſtragglers, who ſeem to be pleaſed with a particularly branch, go and ſettle upon it; others are ſeen to ſucceed, and at laſt, the queen herſelf, when ſhe finds a ſufficient number there before her, goes to make it the place of her head quarters. When the queen is ſettled, the reſt of the ſwarm ſoon follow; and, in about a quarter of an hour, the whole body ſeem to be at eaſe. It ſometimes is found, that there are two or three queens to a ſwarm, and the colony is divided into parties; but it moſt uſually happens, that one of theſe is more conſiderable than the other, and the bees by degrees, deſert the weakeſt, to take ſhelter under the moſt powerful protector. The deſerted queen does not long ſurvive this defeat; ſhe takes refuge under the new monarch, and is ſoon deſtroyed by her jealous rival. Till this cruel execution is performed, the bees never go out to work; and if there ſhould be a queen bee belonging to the new colony left in the old hive, ſhe always undergoes the fate of the former. However, it muſt be obſerved, that the bees never ſacrifice any of their queens, when the hive is full of wax and honey; for there is at that time, no danger in maintaining a plurality of breeders.

When the ſwarm is thus conducted to a place of reſt, and the policy of government is ſettled, the bees ſoon reſume their former labours. The making cells, ſtoring them with honey, impregnating the queen, making proper cells for the reception of the riſing progeny, and protecting them from external danger, employ their unceaſing induſtry. But ſoon after, and towards the latter end of ſummer, when the colony is ſufficiently ſtored with inhabitants, a moſt cruel policy enſues. The drone bees, which are (as has been ſaid) generally in a hive, to the number of a hundred, are marked for ſlaughter. Theſe, which had hitherto led a life of indolence and pleaſure, whoſe only employment was in impregnating the queen, and rioting upon the labours of the hive, without aiding in the general toil, now ſhare the fate of moſt voluptuaries, and fall a ſacrifice to the general reſentment of ſociety.

The working bees, in a body, declare war againſt them; and in two or three days time, the ground all round the hive is covered with their dead bodies. Nay, the working bees will even kill ſuch drones, as are yet in the worm ſtate, in the cell, and eject their bodies from the hive, among the general carnage.

When a hive ſends out ſeveral ſwarms in the year, the firſt is always the beſt, and the moſt numerous. Theſe, having the whole ſummer before them, have the more time for making wax and honey, and conſequently their labours are the moſt valuable to the proprietor. Although the ſwarm chiefly conſiſts of the youngeſt bees, yet it is often found, that bees of all ages compoſe the multitude of emigrants, and it often happens, that bees of all ages are ſeen remaining behind. The number of them is always more conſiderable than that of ſome populous cities, for ſometimes upwards of forty thouſand are found in a ſingle hive. So large a body may well be ſuppoſed to work with great expedition; and in fact, in leſs than twenty-four hours, they will make combs above twenty inches long, and ſeven or eight broad. Sometimes they will half fill their hives with wax, in leſs than five days. In the firſt fifteen days, they are always found to make more wax than they do afterwards during the reſt of the year.

Such are the out-lines of the natural hiſtory of theſe animals, as uſually found in our own country. How they are treated, ſo as to produce the greateſt quantity of honey, belongs rather to the rural œconomiſt, than the natural hiſtorian; volumes have been written on the ſubject, and ſtill more remains equally curious and new. One thing, however, it may be proper to obſerve, that a farm, or a country, may be over-ſtocked with bees, as with any other ſort of animal; for a certain number of hives, always require a certain number of flowers to ſubſiſt on. When the flowers near home are rifled, then are theſe induſtrious inſects ſeen taking more extenſive ranges, but their abilities may be over-taxed; and if they are obliged, in queſt of honey, to go too far from home, they are over-wearied in the purſuit, they are devoured by birds, or beat down by the winds and rain.

From a knowledge of this, in ſome parts of France and Piedmont, they have contrived, as I have often ſeen, a kind of floating bee-houſe.

They have on board one barge, threeſcore or a hundred bee-hives, well defended from the inclemency of an accidental ſtorm; and with theſe the owners ſuffer themſelves to float gently down the river. As the bees are continually chooſing their flowery paſture along the banks of the ſtream, they are furniſhed with ſweets before unrifled; and thus a ſingle floating bee-houſe, yields the proprietor a conſiderable income. Why a method ſimilar to this has never been adopted in England, where we have more gentle rivers, and more flowery banks, than in any other part of the world, I know not; certainly it might be turned to advantage, and yield the poſſeſſor a ſecure, though perhaps a moderate income.

Having mentioned the induſtry of theſe admirable inſects, it will be proper to ſay ſomething of the effects of their labour, of that wax and honey which is turned by man to ſuch various uſes. Bees gather two kinds of wax, one coarſe and the other fine. The coarſer ſort is bitter, and with this, which is called *propolis*, they ſtop up all the holes and crevices of their hives. It is of a more reſinous nature than the fine wax, and is conſequently better qualified to reſiſt the moiſture of the ſeaſon, and preſerve the works warm and dry within. The fine wax is as neceſſary to the animal's preſervation as the honey itſelf. With this they make their lodgings, with this they cover the cells of their young, and in this they lay up their magazines of honey. This is made, as has been already obſerved, from the duſt of flowers, which is carefully kneaded by the little inſect, then ſwallowed, and having undergone a kind of digeſtion, is formed into the cells, which anſwers ſuch a variety of purpoſes. To collect this, the animal rolls itſelf in the flower it would rob, and thus takes up the vegetable duſt with the hair of its body. Then carefully bruſhing it into a lump, with its fore-paws it thruſts the compoſition into two cavities behind the thighs, which are made like ſpoons to receive the wax, and the hair that lines them, ſerves to keep it from falling.

As of wax, there are alſo two kinds of honey; the white and the yellow. The white is taken without fire from the honey-combs. The yellow is extracted by heat, and ſqueezed through bags, in a preſs. The beſt honey is new, thick, and granulated, of a clear tranſparent white colour, of a ſoft and aromatic ſmell, and of a ſweet and lively taſte. Honey made in mountainous countries, is preferable to that of the valley. The honey made in the ſpring, is more highly eſteemed than that gathered in ſummer, which laſt is ſtill more valuable than that of autumn, when the flowers begin to fade and loſe their fragrance.

The bees are nearly alike in all parts of the world, yet there are differences worthy our notice. In Guadaloupe, the bee is leſs by one half, than the European, and more black and round. They have no ſting, and make their cells in hollow trees; where, if the hole they meet with, is too large, they form a ſort of waxen houſe of the ſhape of a pear, and in this they lodge and ſtore their honey, and lay their eggs. They lay up their honey in waxen veſſels, of the ſize of a pigeon's egg, of a black or deep violet colour; and theſe are ſo joined together, that there is no ſpace left between them. The honey never congeals, but is fluid, of the conſiſtence of oil, and the colour of amber. Reſembling theſe, there are found little black bees, without a ſting, in all the tropical climates; and though theſe countries are replete with bees, like our own, yet thoſe form the moſt uſeful and laborious tribe in that part of the world. The honey they produce, is neither ſo unpalatable, nor ſo ſurfeiting as ours; and the wax is ſo ſoft, that it is only uſed for medicinal purpoſes, it being never found hard enough to form into candles, as in Europe.

Of inſects, that receive the name of bees, among us, there are ſeveral; which, however, differ widely from that induſtrious, ſocial race we have been juſt deſcribing. The Humble Bee is the largeſt of all this tribe, being as large as the firſt joint of one's middle finger. Theſe are ſeen in every field, and perched on every flower. They build their neſt in holes in the ground, of dry leaves, mixed with wax and wool, defended with moſs from the weather. Each humble-bee makes a ſeparate cell about the ſize of a ſmall nutmeg, which is round and hollow, containing the honey in a bag. Several of theſe cells are joined together, in ſuch a manner, that the whole appears like a cluſter of grapes. The females, which have the appearance of waſps, are very few, and their eggs are laid in cells, which the reſt ſoon cover over with wax. It is uncertain whether they have a queen or not; but there is one much larger than the reſt, without wings and without hair, and all over black, like poliſhed ebony. This goes and views all the works, from time to time, and enters into the cell, as if it wanted to ſee whether every thing was done right: In the morning, the young humble-bees are very idle, and ſeem not at all inclined to labour, till one of the largeſt, about ſeven o'clock, thruſts half its body from a hole deſigned for that purpoſe, and ſeated on the top of the neſt, beats its wings for twenty minutes ſucceſſively, buzzing the whole time, till the whole colony is put in motion. The humble-bees gather honey, as well as the common bees; but it is neither ſo fine, nor ſo good, nor the wax ſo clean, or ſo capable of fuſion.

Beſides the bees already mentioned, there are various kinds among us, that have much the appearance of honey-makers, and yet make only wax. The Wood-bee is ſeen in every garden. It is rather larger than the common queen-bee; its body of a bluiſh black, which is ſmooth and ſhining. It begins to appear at the approach of ſpring, and is ſeen flying near walls expoſed to a ſunny aſpect. This bee makes its neſt in ſome piece of wood, which it contrives to ſcoop and hollow for its purpoſe. This, however, is never done in trees that are ſtanding, for the wood it makes choice of is half rotten. The holes are not made directly forward, but turning to one ſide, and having an opening ſufficient to admit one's middle finger; from whence runs the inner apartment, generally twelve or fifteen inches long. The inſtruments uſed in boring theſe cavities, are their teeth; the cavity is uſually branched into three or four apartments; and in each of theſe they lay their eggs, to the number of ten or twelve, each ſeparate and diſtinct from the reſt: The egg is involved in a ſort of paſte, which ſerves at once for the young animal's protection and nouriſhment. The grown bees, however, feed upon ſmall inſects, particularly a louſe, of a reddiſh brown colour, of the ſize of a ſmall pin's head.

Maſon Bees make their cells with a ſort of mortar made of earth, which they build againſt a wall that is expoſed to the ſun. The mortar, which at firſt is ſoft, ſoon becomes as hard as ſtone, and in this their eggs are laid. Each neſt contains ſeven or eight cells, an egg in every cell, placed regularly one over the other. If the neſt remains unhurt, or wants but little repairs, they make uſe of them the year enſuing: and thus they often ſerve three or four years ſucceſſively. From the ſtrength of their houſes, one would think theſe bees in perfect ſecurity, yet none are more expoſed than they. A worm with very ſtrong teeth, is often found to bore into their little fortifications, and devour their young.

The Ground Bee builds its neſt in the earth, wherein they make round holes, five or ſix inches deep; the mouth being narrow, and only juſt ſufficient to admit the little inhabitant. It is amuſing enough to obſerve the patience and aſſiduity with which they labour. They carry out all the earth, grain by grain, to the mouth of the hole, where it forms a little hillock, an Alps compared to the power of the artiſt by which it is raiſed. Sometimes the walks of a garden are found undermined by their labours; ſome of the holes running directly downward, others horizontally beneath the ſurface. They lay up in theſe cavities proviſions for their young, which conſiſt of a paſte that has the appearance of corn, and is of a ſweetiſh taſte.

The Leaf-cutting Bees, make their neſt and lay their eggs among bits of leaves, very artificially placed in holes in the earth, of about the length of a tooth-pick caſe. They make the bits of leaves of a roundiſh form, and with them line the inſide of their habitations. This tapeſtry is ſtill further lined by a reddiſh kind of paſte, ſomewhat ſweet or acid. Theſe bees are of various kinds; thoſe that build their neſts with cheſnut-leaves are as big as drones, but thoſe of the roſe-tree are ſmaller than the common bee.

The Wall Bees are ſo called, becauſe they make their neſts in walls of a kind of ſilky membrane with which they fill up the vacuities between the ſmall ſtones which form the ſides of their habitation. Their apartment conſiſts of ſeveral cells placed end to end, each in the ſhape of a woman's thimble. Tho' the web which lines this habitation is thick and warm, yet it is tranſparent and of a whitiſh colour. This ſubſtance is ſuppoſed to be ſpun from the animal's body. The males and females are of a ſize, but the former are without a ſting. To theſe varieties of the bee kind might be added ſeveral others which are all different in nature, but not ſufficiently diſtinguiſhed to excite curioſity.

CHAP. III.

OF THE WASP.

HOWEVER ſimilar many inſects may be in appearance, this does not imply a ſimilitude in their hiſtory. The bee and the waſp reſemble each other very ſtrongly, yet, in examining their manner and their duration, they differ very widely; the bee labours to lay up honey, and lives to enjoy the fruits of its induſtry: the waſp appears equally aſſiduous; but only works for poſterity, as the habitation is ſcarcely completed when the inhabitant dies.

The waſp is well known to be a winged inſect with a ſting. To be longer in proportion to its bulk than the bee, to be marked with bright yellow circles round its body, and to be the moſt ſwift and active inſect of all the fly kind. On each ſide of the mouth this animal is furniſhed with a long tooth, notched like a ſaw, and with theſe it is enabled to cut any ſubſtance, not omitting meat itſelf, and to carry it to its neſt. Waſps live like bees in community, and ſometimes ten or twelve thouſand are found inhabiting a ſingle neſt.

Of all other inſects the waſp is the moſt fierce, voracious, and moſt dangerous, when enraged. They are ſeen wherever fleſh is cutting up, gorging themſelves with the ſpoil, and then flying to their neſts with their reeking prey. They make war alſo on every other fly, and the ſpider himſelf dreads their approaches.

Every community among bees is compoſed of females or queens, drones or males, and neutral or workings bees.—Waſps have ſimilar occupations; the two firſt are for propagating the ſpecies, the laſt for nurſing, defending, and ſupporting the riſing progeny. Among bees, however, there is ſeldom above a queen or two in a hive; among waſps there are above two or three hundred.

As ſoon as the ſummer begins to invigorate the inſect tribes, the waſps are the moſt of the number, and diligently employed either in providing proviſions for their neſt, if already made, or in making one, if the former habitation be too ſmall to receive the increaſing community. The neſt is one of the moſt curious objects in natural hiſtory, and contrived almoſt as artificially as that of the bees themſelves. Their principal care is to ſeek out a hole that has been begun by ſome other animal, a field-mouſe, a rat, or a mole, to build their neſts in. They ſometimes build upon the plain, where they are ſure of the dryneſs of their ſituation, but moſt commonly on the ſide of a bank to avoid the rain or water that would otherwiſe annoy them. When they have choſen a proper place, they go to work with wonderful aſſiduity.—Their firſt labour is to enlarge and widen the hole, taking away the earth and carrying it off to ſome diſtance. They are perfectly formed for labour, being furniſhed with a trunk above their mouths, two ſaws on each ſide, which play to the right and left againſt each other, and ſix ſtrong, muſcular legs to ſupport them. They cut the earth into ſmall parcels with their ſaws, and carry it out with their legs or paws. This is the work of ſome days; and at length the outline of their habitation is formed, making a cavity of about a foot and a half every way. While ſome are working in this manner, others are roving the fields to ſeek out materials for their building. To prevent the earth from falling down and cruſhing their riſing city into ruin, they make a ſort of roof with their gluey ſubſtance, to which they begin to fix the rudiments of their building, working from the top downwards, as if they were hanging a bell, which, however, at length they cloſe up at the bottom. The materials with which they build their neſts are bits of wood and glue.—The wood they get where they can from the rails and poſts which they meet with in the fields and elſewhere. Theſe they ſaw and divide into a multitude of ſmall fibres, of which they take up little bundles in their claws, letting fall upon them a few drops of gluey matter, with which their bodies are provided, by the help of which they knead the whole compoſition into a paſte, which ſerves them in their future building. When they have returned with this to their neſt, they ſtick their load of paſte on that part where they make their walls and partitions; they tread it cloſe with their feet, and trowel it with their trunks, ſtill going backwards as they work. Having repeated this operation three or four times, the compoſition is at length flatted out until it becomes a ſmall leaf of a grey colour, much finer than paper, and of a pretty firm texture. This done, the ſame waſp returns to the field to collect a ſecond load of paſte, repeating the ſame ſeveral times, placing layer upon layer, and ſtrengthening every partition in proportion to the wants or convenience of the general fabric. Other working waſps come quickly after to repeat the ſame operation, laying more leaves upon the former, till at length, after much toil, they have finiſhed the large roof which is to ſecure them from the tumbling in of the earth. This dome being finiſhed, they make another entrance to their habitation, deſigned either for letting in the warmth of the ſun, or for eſcaping in caſe one door be invaded by plunderers. Certain however it is, that by one of theſe they always enter, by the other they ſally forth to their toil; each hole being ſo ſmall that they can paſs but one at a time. The walls being thus compoſed, and the whole ſomewhat of the ſhape of a pear, they labour at their cells, which they compoſe of the ſame paper-like ſubſtance that goes to the formation of the outſide works. Their combs differ from thoſe of bees, not leſs in the compoſition than the poſition which they are always ſeen to obtain. The honey-comb of the bee is edgeways with reſpect to the hive; that of the waſp is flat, and the mouth of every cell opens downwards. Thus is their habitation contrived, ſtory above ſtory, ſupported by ſeveral rows of pillars which give firmneſs to the whole building, while the upper ſtory is flat-roofed, and ſmooth as the pavement of a room, laid with ſquares of marble. The waſps can freely walk upon theſe ſtories between the pillars to do whatever their wants require. The pillars are very hard and compact, being larger at each end than in the middle, not much unlike the columns of a building. All the cells of the neſt are only deſtined for the reception of the young, being replete with neither wax nor honey.

Each cell is like that of the bee, hexagonal; but they are of two ſorts, the one larger for the production of the male and female waſps, the other leſs for the reception of the working part of the community. When the females are impregnated by the males, they lay their eggs, one in each cell, and ſtick it in with a kind of gummy matter to prevent its falling out. From this egg proceeds the inſect in its worm-ſtate, of which the old ones are extremely careful, feeding it from time to time till it becomes large, and entirely fills up its cell. But the waſp community differs from that of the bee in this; that among the latter the working bees take the parental duties upon them, whereas among the waſps the females alone are permitted to feed their young, and to nurſe their riſing progeny. For this purpoſe the female waits with great patience till the working waſps have brought in their proviſions, which ſhe takes from them, and cuts into pieces. She then goes with great compoſure from cell to cell, and feeds every young one with her mouth. When the young worms have come to a certain ſize they leave off eating, and begin to ſpin a very fine ſilk, fixing the firſt end to the entrance of the cell, then turning their heads, firſt on one ſide, then on the other, they fix the thread to different parts, and thus they make a ſort of a door, which ſerves to cloſe up the mouth of the cell. After this they diveſt themſelves of their ſkins after the uſual mode of transformation, the aurelia, by degrees, begins to emancipate itſelf from its ſhell; by little and little it thruſts out its legs and wings, and inſenſibly acquires the colour and ſhape of its parent.

The waſp thus formed, and prepared for depredation, becomes a bold, troubleſome, and dangerous inſect: there are no dangers that it will not encounter in purſuit of its prey, and nothing ſeems to ſatiate its gluttony. Though it can gather no honey of its own, no animal is more fond of ſweets. For this purpoſe, it will purſue the bee and the humble bee, deſtroy them with its ſting, and then plunder them of their honey-bag, with which it flies triumphantly loaded to its neſt to regale its young. Waſps are ever fond of making their neſts in the neighbourhood of bees, merely to have an opportunity of robbing their hives, and feaſting on the ſpoil. Yet the bees are not found always patiently ſubmiſſive to their tyranny, but fierce battles are ſometimes ſeen to enſue, in which the bees make up by conduct and numbers what they want in perſonal prowefs. When there is no honey to be had, they ſeek for the beſt and ſweeteſt fruits, and they are never miſtaken in their choice. From the garden they fly to the city, to the grocers' ſhops, and butchers' ſhambles. They will ſometimes carry off bits of fleſh half as big as themſelves, with which they fly to their neſts for the nouriſhment of their brood. Thoſe who cannot drive them away, lay for them a piece of ox's liver, which being without fibres, they prefer to other fleſh; and whenever they are found, all other flies are ſeen to deſert the place immediately. Such is the dread with which theſe little animals impreſs all the reſt of the inſect tribes, which they ſeize and devour without mercy, that they vaniſh at their approach. Wherever they fly, like the eagle or the falcon, they form a deſert in the air around them. In this manner the ſummer is paſſed in plundering the neighbourhood, and rearing up their young; every day adds to their numbers; and from their ſtrength, agility, and indiſcriminate appetite for every kind of proviſion, were they as long-lived as the bee, they would ſoon ſwarm upon the face of Nature, and become the moſt noxious plague of man: but providentially their lives are meaſured to their miſchief, and they live but a ſingle ſeaſon.

While the ſummer heats continue, they are bold, voracious, and enterpriſing; but as the ſun withdraws, it ſeems to rob them of their courage and activity. In proportion as the cold increaſes, they are ſeen to become more domeſtic; they ſeldom leave the neſt, they make but ſhort adventures from home, they flutter about in the noon-day heats, and ſoon after return chilled and feeble.

As their calamities increaſe, new paſſions ſoon begin to take place; the care for poſterity no longer continues, and as the parents are no longer able to provide their growing progeny a ſupply, they take the barbarous reſolution of ſacrificing them all to the neceſſity of the times. In this manner, like a garriſon upon ſhort allowance, all the uſeleſs hands are deſtroyed; the young worms, which a little before they fed and protected with ſo much aſſiduity, are now butchered and dragged from their cells. As the cold increaſes they no longer find ſufficient warmth in their neſts which grow hateful to them, and they fly to ſeek it in the corners of houſes, and places that receive an artificial heat. But the winter is ſtill inſupportable; and, before the new year begins, they wither and die; the working waſps firſt, the males ſoon following, and many of the females ſuffer in the general calamity. In every neſt, however, one or two females ſurvive the winter, and having been impregnated by the male during the preceding ſeaſon, ſhe begins in ſpring to lay her eggs in a little hole of her own contrivance. This bundle of eggs which is cluſtered together like grapes, ſoon produces two worms which the female takes proper precaution to defend and ſupply, and theſe when hatched ſoon give aſſiſtance to the female, who is employed in hatching two more; theſe alſo gathering ſtrength, extricate themſelves out of the web that incloſed them, and become likewiſe aſſiſtants to their mother; fifteen days after, two more make their appearance; thus is the community every day increaſing, while the female lays in every cell, firſt a male and then a female. Theſe ſoon after become breeders in turn, till, from a ſingle female, ten thouſand waſps are ſeen produced before the month of June. After the female has thus produced her progeny, which are diſtributed in different diſtricts, they aſſemble from all parts, in the middle of ſummer, and provide for themſelves the large and commodious habitation, which has been deſcribed above.

Such is the hiſtory of the ſocial waſp; but, as among bees, ſo alſo among theſe inſects, there are various tribes that live in ſolitude: theſe lay their eggs in a hole for the purpoſe, and the parent dies long before the birth of its offſpring. In the principal ſpecies of the Solitary Waſps, the inſect is ſmaller than the working waſp of the ſocial kind. The filament by which the corſelet is joined to the body, is longer and more diſtinctly ſeen, and the whole colour of the inſect is blacker than in the ordinary kinds. But it is not their figure, but the manners of this extraordinary inſect that claim our principal regard.

From the end of May to the beginningof July, this waſp is ſeen moſt diligently employed. The whole purpoſe of its life ſeems to be in contriving and fitting up a commodious apartment for its young one, which is not to ſucceed it till the year enſuing. For this end it is employed with unwearied aſſiduity in boring a hole into the fineſt earth ſome inches deep, but not much wider than the diameter of its own body. This is but a gallery leading to a wider apartment deſtined for the convenient lodgment of its young.—As it always chooſes a gravelly ſoil to work in, and where the earth is almoſt as hard as ſtone itſelf, the digging and hollowing this apartment is an enterpriſe of no ſmall labour: for effecting its operations, this inſect is furniſhed with two teeth, which are ſtrong and firm, but not ſufficiently hard to penetrate the ſubſtance through which it is reſolved to make its way. In order, therefore, to ſoften that earth which it is unable to pierce, it is furniſhed with a gummy liquor which it emits upon the place, and which renders it more eaſily ſeparable from the reſt, and the whole becoming a kind of ſoft paſte is removed to the mouth of the habitation. The animal's proviſion of liquor in theſe operations is however ſoon exhauſted; and it is then ſeen either taking up water from ſome neighbouring flower or ſtream in order to ſupply the deficiency.

At length, after much toil, a hole ſome inches deep is formed, at the bottom of which is a large cavity; and to this no other hoſtile inſect would venture to find its way, from the length and the narrowneſs of the defile through which it would be obliged to paſs. In this the ſolitary waſp lays its egg, which is deſtined to continue the ſpecies; there the naſcent animal is to continue for above nine months, unattended and immured, and at firſt appearance, the moſt helpleſs inſect of the creation. But when we come to examine, new wonders offer, no other inſect can boaſt ſo copiouſly luxurious a proviſion, or ſuch confirmed ſecurity.

As ſoon as the mother waſp has depoſited her egg at the bottom of the hole, her next care is to furniſh it with a ſupply of proviſions, which may be offered to the young inſect as ſoon as it leaves the egg. To this end ſhe procures a number of little green worms, generally from eight to twelve, and theſe are to ſerve as food for the young one the inſtant it awakens into life. When this ſupply is regularly arranged and laid in, the old one then, with as much aſſiduity as it before worked out its hole, now cloſes the mouth of the paſſage; and thus leaving its young one immured in perfect ſecurity, and in a copious ſupply of animal food, ſhe dies ſatisfied with having provided for a future progeny.

When the young one leaves the egg it is ſcarcely viſible, and is ſeen immured among a number of inſects, infinitely larger than itſelf, ranged in proper order around it; which, however, give it no manner of apprehenſion. Whether the parent, when ſhe laid in the inſect proviſion, contrived to diſable the worms from reſiſtance, or whether they were at firſt incapable of any, is not known. Certain it is, that the young glutton feaſts upon the living ſpoil without any controul; his game lies at his hand, and he devours one after the other as the calls of appetite incite him. The life of the young animal is therefore ſpent in the moſt luxurious manner, till its whole ſtock of worms is exhauſted, and then the time of its transformation begins to approach; and then ſpinning a ſilken web, it continues fixed in its cell till the ſun calls it from its dark abode the enſuing ſummer.

The waſps of Europe are very miſchievous; yet they are innocence itſelf when compared to thoſe of the tropical climates, where all the inſect tribes are not only numerous, but large, voracious, and formidable. Thoſe of the Weſt Indies are thicker, and twice as long as the common bee; they are of a grey colour, ſtriped with yellow, and armed with a very dangerous ſting. They make their cells in the manner of a honey-comb, in which the young ones are hatched and bred. They generally hang their neſts by threads, compoſed of the ſame ſubſtance with the cells, to the branches of trees; and the eaves of houſes. They are ſeen every where in great abundance, deſcending like fruit, particularly pears, of which ſhape they are, and as large as one's head. The inſide is divided into three round ſtories, full of cells, each hexagonal, like thoſe of a honey-comb. In ſome of the iſlands theſe inſects are ſo very numerous, that their neſts are ſtuck up in this manner, ſcarce two feet aſunder, and the inhabitants are in continual apprehenſion from their accidental reſentment. It ſometimes happens, that no precautions can prevent their attacks, and the pains of their ſting is almoſt inſupportable. Thoſe who have felt it think it more terrible than even that of a ſcorpion; the whole viſage ſwells, and the features are ſo disfigured, that a perſon is ſcarcely known by his moſt intimate acquaintance.

CHAP. IV.

OF THE ICHNEUMON FLY.

EVERY rank of inſects, how voracious ſoever, have enemies that are terrible to them, and that revenge upon them the injuries done upon the reſt of the Animated Creation.—The waſp, as we have ſeen, is very troubleſome to man, and very formidable to the inſect tribe; but the ichneumon fly (of which there are many varieties) fears not the waſp itſelf, it enters its retreats, plunders its habitations, and takes poſſeſſion of that cell for its own young, which the waſp had laboriouſly built for a dearer poſterity.

Though there are many different kinds of this inſect, yet the moſt formidable, and that beſt known, is called the common ichneumon, with four wings, like the bee, a long, ſlender, black, body, and a three-forked tail, conſiſting of briſtles; the two outermoſt black, and the middlemoſt red. This fly receives its name from the little quadruped, which is found to be ſo deſtructive to the crocodile, as it bears a ſtrong ſimilitude in its courage and rapacity.

Though this inſtrument is, to all appearance, ſlender and feeble, yet it is found to be a weapon of great force and efficacy. There is ſcarce any ſubſtance which it will not pierce; and, indeed, it is ſeldom ſeen but employed in penetration. This is the weapon of defence, this is employed in deſtroying its prey, and ſtill more, by this the animal depoſits her eggs wherever ſhe thinks fit to lay them. As it is an inſtrument chiefly employed for this purpoſe, the male is unprovided with ſuch a ſting, while the female uſes it with great force and dexterity, brandiſhing it when caught, from ſide to ſide, and very often wounding thoſe who thought they held her with the greateſt ſecurity.

All the flies of this tribe are produced in the ſame manner, and owe their birth to the deſtruction of ſome other inſect, within whoſe body they have been depoſited, and upon whoſe vitals they have preyed, till they came to maturity. There is no inſect whatever, which they will not attack, in order to leave their fatal preſent in its body; the caterpillar, the gnat, and even the ſpider himſelf, ſo formidable to others, is often made the unwilling foſterer of this deſtructive progeny.

About the middle of ſummer, when other inſects are found in great abundance, the ichneumon is ſeen flying buſily about, and ſeeking proper objects upon whom to depoſe its progeny. As there are various kinds of this fly, ſo they ſeem to have various appetites. Some are found to place their eggs within the aurelia of ſome naſcent inſect, others place them within the neſt, which the waſp had curiouſly contrived for its own young; and as both are produced at the ſame time, the young of the ichneumon, not only devours the young waſp, but the whole ſupply of worms, which the parent had carefully provided for its proviſion. But the greateſt number of the ichneumon tribe are ſeen ſettling upon the back of the caterpillar, and darting, at different intervals, their ſtings into its body. At every dart they depoſite an egg, while the wounded animal ſeems ſcarcely ſenſible of the injury it ſuſtains. In this manner they leave from ſix to a dozen of their eggs, within the fatty ſubſtance of the reptile's body, and then fly off to commit further depredations. In the mean time the caterpillar thus irreparably injured, ſeems to feed as voraciouſly as before, does not abate of its uſual activity; and to all appearance, ſeems no way affected by the internal enemies that are preparing its deſtruction in their darkſome abode. But they ſoon burſt from their egg ſtate, and begin to prey upon the ſubſtance of their priſon. As they grow larger, they require a greater ſupply, till at laſt the animal, by whoſe vitals they are ſupported, is no longer able to ſuſtain them, but dies; its whole inſide being almoſt eaten away. It often happens, however, that it ſurvives their worm ſtate, and then they change into a chryſalis, incloſed in the caterpillar's body till the time of their delivery approaches, when they burſt their priſons and fly away. The caterpillar, however, is irreparably deſtroyed, it never changes into a chryſalis, but dies ſhortly after, from the injuries it had ſuſtained.

Such is the hiſtory of this fly, which though very terrible to the inſect tribe, fails not to be of infinite ſervice to mankind. The millions which it kills in a ſingle ſummer, are inconceivable; and without ſuch a deſtroyer, the fruits of the earth would only riſe to furniſh a banquet for the inſect race, to the excluſion of all the nobler ranks of Animated Nature.

CHAP. V.

OF THE ANT.

THOUGH the number of two-winged flies be very great, and the naturaliſts have taken ſome pains to deſcribe their characters and varieties; yet there is ſuch a ſimilitude in their forms and manners, that in a work like this, one deſcription muſt ſerve for all. We now therefore, come to a ſpecies of four-winged inſects, that are famous from all antiquity, for their ſocial and induſtrious habits, that are marked for their ſpirit of ſubordination, that are offered as a patron of parſimony to the profuſe, and of unremitting diligence to the ſluggard.

In the experiments, however, which have been more recently made, and the obſervations which have been taken, much of their boaſted frugality and precaution ſeems denied them; the treaſures they lay up are no longer ſuppoſed intended for future proviſion, and the choice they make in their ſtores, ſeems no way dictated by wiſdom. It is, indeed, ſomewhat ſurpriſing, that almoſt every writer of antiquity ſhould deſcribe this inſect, as labouring in the ſummer, and feaſting upon the produce during the winter.— Perhaps, in ſome of the warmer climates, where the winter is mild, and of ſhort continuance, this may take place; but in France and England, theſe animals can have no manner of occaſion for a ſupply of winter proviſions, as they are actually in a ſtate of torpidity during that ſeaſon.

The common ants of Europe, are of two or three different kinds; ſome red, ſome black, ſome with ſtings, and others without, ſuch as have ſtings inflict their wounds in that manner; ſuch as are unprovided with theſe weapons of defence, have a power of ſpurting, from their hinder parts, an acid pungent liquor, which, if it lights upon the ſkin, inflames and burns it like nettles.

The body of an ant is divided, into the head, breaſt, and belly. In the head the eyes are placed, which are entirely; black and under the eyes, there are two ſmall horns or feelers, compoſed of twelve joints, all covered with a fine ſilky hair. The mouth is furniſhed with two crooked jaws, which project outwards, in each of which are ſeen inciſures, that look like teeth. The breaſt is covered with a fine ſilky hair, from which project ſix legs, that are pretty ſtrong and hairy; the extremities of each armed with two ſmall claws, which the animal uſes in climbing. The belly is more reddiſh than the reſt of the body, which is of a brown cheſnut colour, ſhining as glaſs, and covered with extremely fine hair.

From ſuch a formation, this animal ſeems bolder, and more active, for its ſize, than any other of the inſect tribe and fears not to attack a creature, often above ten times its own magnitude.

As ſoon as the winter is paſt, in the firſt fine day in April, the ant-hill, that before ſeemed a deſert, now ſwarms with new life, and myriads of theſe inſects are ſeen juſt awaked from their annual lethargy, and preparing for the pleaſures and fatigues of the ſeaſon. For the firſt day they never offer to leave the hill, which may be conſidered as their citadel, but run over every part of it, as if to examine its preſent ſituation, to obſerve what injuries it has ſuſtained during the rigours of winter*, while they ſlept, and to mediate and ſettle the labours of the day enſuing.

At the firſt diſplay of their forces, none but the wingleſs tribe appears, while thoſe furniſhed with wings remain at the bottom. Theſe are the working ants, that firſt appear, and that are always deſtitute of wings; the males and females, that are furniſhed with four large wings each, are more ſlow in making their appearance.

Thus, like bees, they are divided into males, females, and and the neutral or the working tribe. Theſe are all eaſily diſtinguiſhed from each other; the females are much larger than the males; the working ants are the ſmalleſt of all. The two former have wings; which, however, they ſometimes are diveſted of; the latter never have

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[*] Memoirs pour ſervir a l'Hiſtoire des inſectes par Charles de Geer.

any, and upon them are devolved all the labours that tend to the welfare of the community. The female, alſo, may be diſtinguiſhed, by the colour and ſtructure of her breaſt, which is a little more brown, than that of the common ant, and a little brighter than that of the male.

In eight or ten days after their firſt appearance, the labours of the hill are in ſome forwardneſs; the males and females are ſeen with the working multitude, and purſued or purſuing each other. They ſeem no way to partake in the common drudgeries of the ſtate; the males purſue the females with great aſſiduity, and in a manner force them to compliance. They remain coupled for ſome time, while the males thus united, ſuffer themſelves to be drawn along by the will of their partners.

In the mean time, the working body of the ſtate takes no part in their pleaſures, they are ſeen diligently going from the ant-hill, in purſuit of food for themſelves and their aſſociates, and of proper materials for giving a comfortable retreat to their young, or ſafety to their habitation. In the fields of England, ant-hills are formed with but little apparent regularity. In the more ſouthern provinces of Europe, they are conſtructed with wonderful contrivance, and offer a ſight highly worthy a naturaliſt's curioſity. Theſe are generally formed in the neighbourhood of ſome large tree and a ſtream of water. The one is conſidered by the animals, as the proper place for getting food; the other for ſupplying them with moiſture, which they cannot well diſpenſe with. The ſhape of the ant-hill, is that of a ſugar loaf, about three feet high, compoſed of various ſubſtances; leaves, bits of wood, ſand, earth, bits of gum, and grains of corn. Theſe are all united into a compact body, perforated with galleries down to the bottom, and winding ways within the body of the ſtructure. From this retreat, to the water, as well as to the tree, in different directions, there are many paths worn by conſtant aſſiduity, and along theſe the buſy inſects are ſeen paſſing and repaſſing continually; ſo that from May, or the beginning of June, according to the ſtate of the ſeaſon, they work continually, till the bad weather comes on.

The chief employment of the working ants, is in ſuſtaining not only the idlers at home, but alſo finding a ſufficiency of food for themſelves. They live upon various proviſions, as well of the vegetable as the animal kind. Small inſects they will kill and devour; ſweets of all kinds they are particularly fond of. They ſeldom, however, think of their community, till they themſelves are firſt ſatiated. Having found a juicy fruit, they ſwallow what they can, and then tearing it in pieces, carry home their load. If they meet with an inſect above their match, ſeveral of them will fall upon it at once, and having mangled it, each will carry off a part of the ſpoil. If they meet, in their excurſions, any thing that is too heavy for one to bear, and yet, which they are unable to divide, ſeveral of them will endeavour to force it along; ſome dragging and others puſhing. If any one of them happens to make a lucky diſcovery, it will immediately give advice to others, and then at once, the whole republic will put themſelves in motion. If in theſe ſtruggles, one of them happens to be killed, ſome kind ſurvivor will carry him off to a great diſtance, to prevent the obſtructions his body might give to the general ſpirit of induſtry.

But while they are thus employed in ſupporting the ſtate, in feeding abroad, and carrying in proviſions to thoſe that continue at home, they are not unmindful of poſterity. After a few days of fine weather, the female ants begin to lay their eggs, and thoſe are as aſſiduouſly watched and protected by the working ants, who take upon themſelves to ſupply whatever is wanting to the naſcent animal's coveniience or neceſſity. They are carried as ſoon as laid, to the ſafeſt ſituation, at the bottom of their hill, where they are carefully defended from cold and moiſture. We are not to ſuppoſe, that thoſe white ſubſtances which we ſo plentifully find in every ant-hill, are the eggs as newly laid. On the contrary, the ant's egg is ſo very ſmall, that, though laid upon a black ground, it can ſcarcely be diſcerned. The little white bodies we ſee, are the young animals in the maggot ſtate, endued with life long ſince freed from the egg, and often involved in a cone, which it has ſpun round itſelf, like the ſilk worm. The real egg when laid, if viewed through a microſcope, appears ſmooth, poliſhed, and ſhining, while the maggot is ſeen compoſed of twelve rings, and is oftner larger than the ant itſelf.

It is impoſſible to expreſs the fond attachment which the working ants ſhew to their riſing progeny. In cold weather they take them in their mouths, but without offering them the ſmalleſt injury, to the very depths of their habitation, where they are leſs ſubject to the ſeverity of the ſeaſon. In a fine day they remove them, with the ſame care, nearer the ſurface, where their maturity may be aſſiſted by the warm beams of the ſun. If a formidable enemy ſhould come to batter down their whole habitation, and cruſh them by thouſands in the ruin, yet theſe wonderful inſects, ſtill mindful of their parental duties, make it their firſt care to ſave their offspring. They are ſeen running wildly about, and different ways, each loaded with a young one, often bigger than the inſect that ſupports it. I have kept, ſays Swammerdam, ſeveral of the working ants in my cloſet, with their young, in a glaſs filled with earth. I took pleaſure in obſerving, that in proportion as the earth dried on the ſurface, they dug deeper and deeper to depoſit their eggs; and when I poured water thereon, it was ſurpriſing to ſee with what care, affection, and diligence they laboured, to put their brood in ſafety, in the drieſt place. I have ſeen alſo, that when water has been wanting for ſeveral days, and when the earth was moiſtened after it a little, they immediately carried their young ones to have a ſhare, who ſeemed to enjoy and ſuck the moiſture.

When the young maggot is come to its full growth, the breaſt ſwells inſenſibly, it caſts its ſkin, and loſes all motion. All the members which were hidden before, then begin to appear, an aurelia is formed, which repreſents very diſtinctly all the parts of the animal, though they are yet without motion, and as it were, wrapped up in ſwaddling-clothes. When at length, the little inſect has paſſed through all its changes, and acquired its proper maturity, it burſts this laſt ſkin, to aſſume the form it is to retain ever after. Yet this is not done by the efforts of the little animal alone, for the old ones very aſſiduouſly break open, with their teeth, the covering in which it is incloſed. Without this aſſiſtance the aurelia would never be able to get free, as M. De Geer often found, who tried the experiment, by leaving the aurelia to themſelves. The old ones not only aſſiſt them, but know the very preciſe time for lending their aſſiſtance, for if produced too ſoon the young one dies of cold, if retarded too long it is ſuffocated in its priſon.

When the female has done laying, and the whole brood is thus produced, her labours, as well as that of the male, become unneceſſary, and her wings, which ſhe had but a ſhort time before ſo actively employed, drop off. What becomes of her when thus diveſted of her ornaments is not well known, for ſhe is ſeen in the cells for ſome weeks after. The males, on the other hand, having no longer any occupation at home, make uſe of thoſe wings with which they have been furniſhed by nature, and fly away, never to return, or to be heard of more. It is probable they periſh with the cold, or are devoured by the birds, which are particularly fond of this petty prey.

In the mean time, the working ants having probably depoſed their queens, and being deſerted by the males, that ſerved but to clog the community, prepare for the ſeverity of the winter, and bury their retreats as deep in the earth as they conveniently can. It is now found that the grains of corn, and other ſubſtances with which they furniſh their hill, are only meant as fences to keep off the rigours of the weather, not as proviſions to ſupport them during its continuance. It is found generally to obtain, that every inſect lives a year after it comes to its full growth, is obliged to paſs four or five months without taking any nouriſhment, and will ſeem to be dead all that time. It would be to no purpoſe therefore for ants to lay up corn for the winter, ſince they lie that time without motion, heaped upon each other, and are ſo far from eating, that they are utterly unable to ſtir. Thus what authors have dignified by the name of a magazine, appears to be no more than a cavity, which ſerves for a common retreat when the weather forces them to return to their lethargic ſtate.

What has been ſaid with exaggeration of the European ant, is however true, if aſſerted of thoſe of the tropical climates. They build an ant-hill with great contrivance and regularity, they lay up proviſions, and, as they probably live the whole year, they ſubmit themſelves to regulations entirely unknown among the ants of Europe.

Thoſe of Africa are of three kinds, the red, the green and the black; the latter are above an inch long, and in every reſpect a moſt formidable inſect. Their ſting produces extreme pain, and their depredations are ſometimes extremely deſtructive. They build an ant-hill of a very great ſize, from ſix to twelve feet high; it is made of viſcous clay, and tapers into a pyramidal form. This habitation is conſtructed with great artifice, and the cells are ſo numerous and even, that a honey-comb ſcarce exceeds them in number and regularity.

The inhabitants of this edifice ſeem to be under a very ſtrict regulation. At the ſlighteſt warning they will ſally out upon whatever diſturbs them, and if they have time to arreſt their enemy, he is ſure to find no mercy. Sheep, hens, and even rats are often deſtroyed by theſe mercileſs inſects, and their fleſh devoured to the bone. No anatomiſt in the world can ſtrip a ſkeleton ſo cleanly as they, and no animal, how ſtrong ſoever, when they have once ſeized upon it, has power to eſcape.

It often happens that theſe inſects quit their retreat in a body, and go in queſt of adventures. "During my ſtay," ſays Smith, "at Cape Corſe Caſtle, a body of theſe ants came to pay us a viſit in our fortification. It was about day-break when the advanced guard of this famiſhed crew entered the chapel, where ſome Negro ſervants were aſleep upon the floor. The men were quickly alarmed at the invaſion of this unexpected army, and prepared, as well as they could, for a defence. While the foremoſt battalion of inſects had already taken poſſeſſion of the place, the rear-guard was more than a quarter of a mile diſtant. The whole ground ſeemed alive, and crawling with unceaſing deſtruction. After deliberating a few moments upon what was to be done, it was reſolved to lay a large train of gunpowder along the path they had taken, by this means millions were blown to pieces, and the rear-guard perceiving the deſtruction of their leaders, thought proper inſtantly to return, and make back to their original habitation."

The order which theſe ants obſerve, ſeems very extraordinary; whenever they ſally forth, fifty or ſixty larger than the reſt, are ſeen to head the band, and conduct them to their deſtined prey. If they have a fixed ſpot where their prey continues to reſort, they form a vaulted gallery, which is ſometimes a quarter of a mile in length, and yet, they will hollow it out in the ſpace of ten or twelve hours.

BEETLES

CHAP. VI.

OF THE BEETLE AND ITS VARIETIES.

HITHERTO we have been treating of inſects with four tranſparent wings, we now come to a tribe with two tranſparent wings, with caſes that cover them cloſe while at reſt, but which allow them their proper play when flying. The principal of theſe are the Beetle, the May Bug, and the Cantharis. Theſe are all bred like the reſt of their order, firſt from eggs; then they become grubs, then a chryſalis, in which the parts of the future fly are diſtinctly ſeen, and laſtly, the animal leaves its priſon, breaking forth as a winged animal in full maturity.

Of the Beetle there are various kinds; all, however, concurring in one common formation of having caſes to their wings, which are the more neceſſary to thoſe inſects, as they often live under the ſurface of the earth, in holes, which they dig out by their own induſtry. Theſe caſes prevent the various injuries their real wings might ſuſtain, by rubbing or cruſhing againſt the ſides of their abode. Theſe, though they do not aſſiſt flight, yet keep the internal wings clean and even, and produce a loud buzzing noiſe when the animal riſes in the air.

If we examine the formation of all animals of the beetle kind, we ſhall find, as in ſhell-fiſh, that their bones are placed externally, and their muſcles within. Theſe muſcles are formed very much like thoſe of quadrupeds, and are endued with ſuch ſurpriſing ſtrength, that bulk for bulk, they are a thouſand times ſtronger than thoſe of a man. The ſtrength of theſe muſcles is of uſe in digging the animal's ſubterraneous abode, where it is moſt uſually hatched, and to which it moſt frequently returns, even after it becomes a winged inſect, capable of flying.

Beſide the difference which reſults from the ſhape and colour of theſe animals, the ſize alſo makes a conſiderable one; ſome beetles being not larger than the head of a pin, while others, ſuch as the elephant beetle, are as big as one's fiſt: But the greateſt difference among them is, that ſome are produced in a month, and in a ſingle ſeaſon go through all the ſtages of their exiſtence, while others take near four years to their production; and live as winged inſects a year more. To give the hiſtory of all theſe animals, that are bred pretty much in the ſame way, would be inſipid and endleſs; it will ſuffice to ſelect one or two from the number, the origin of which may ſerve as ſpecimens of the reſt. I will, therefore, offer the hiſtory of the May-bug to the reader's attention; premiſing that moſt other beetles, though not ſo long-lived, are bred in the ſame manner.

The May-bug, or dorr-beetle, as ſome call it, has, like all the reſt, a pair of caſes to its wings, which are of a reddiſh brown colour, ſprinkled with a whitiſh duſt, which eaſily comes off. In ſome years their necks are ſeen covered with a red plate, and in others, with a black; theſe, however, are diſtinct ſorts, and their difference is by no means accidental. The fore-legs are very ſhort, and the better calculated for burrowing in the ground, where this inſect makes its retreat. It is well known, for its evening buzz, to children; but ſtill more formidably introduced to the acquaintance of huſbandmen and gardeners, for in ſome ſeaſons, it has been found to ſwarm in ſuch numbers, as to eat up every vegetable production.

The two ſexes in the May-bug, are eaſily diſtinguiſhed from each other, by the ſuperior length of the tufts, at the end of the horns, in the male. They begin to copulate in ſummer, and at that ſeaſon, they are ſeen joined together for a conſiderable time. The female being impregnated, quickly falls to boring a hole in the ground, where to depoſit her burthen. This is generally about half a foot deep, and in it ſhe places her eggs, which are of an oblong ſhape, with great regularity, one by the other. They are of a bright yellow colour, and no way wrapped up in a common covering, as ſome have imagined. When the female is lightened of her burthen, ſhe again aſcends from her hole, to live as before, upon leaves and vegetables, to buzz in the ſummer evening, and to lie hid, among the branches of trees, in the heat of the day.

In about three months after theſe eggs have been thus depoſited in the earth, the contained inſect begins to break its ſhell, and a ſmall grub or maggot crawls forth, and feeds upon the roots of whatever vegetable it happens to be neareſt.

All ſubſtances of this kind ſeem equally grateful, yet it is probable the mother inſect has a choice among what kind of vegetables ſhe ſhall depoſit her young. In this manner theſe voracious creatures continue in the worm ſtate, for more than three years, devouring the roots of every plant they approach, and making their way under ground, in queſt of food, with great deſpatch and facility. At length they grow to above the ſize of a walnut, being a great thick white maggot with a red head; which is ſeen moſt frequently in new-turned earth, and which is ſo eagerly ſought after by birds of every ſpecies. When largeſt, they are found an inch and a half long, of a whitiſh yellow colour, with a body conſiſting of twelve ſegments or joints, on each ſide of which there are nine breathing-holes, and three red feet. The head is large in proportion to the body, of a reddiſh colour, with a pincer before, and a ſemi-circular lip, with which it cuts the roots of plants, and ſucks out their moiſture. As this inſect lives entirely under ground, it has no occaſion for eyes, and accordingly it is found to have none; but it is furniſhed with two feelers, which, like the crutch of a blind man, ſerves to direct its motions. Such is the form of this animal, that lives for years in the worm ſtate underground, ſtill voracious, and every year changing its ſkin.

It is not till the end of the fourth year, that this extraordinary inſect prepares to emerge from its ſubterraneous abode, and even this is not effected, but by a tedious preparation. About the latter end of autumn, the grub begins to perceive the approaches of its transformation, it then buries itſelf deeper and deeper in the earth, ſometimes ſix feet beneath the ſurface, and there forms itſelf a capacious apartment, the walls of which it renders very ſmooth and ſhining, by the excretions of its body. Its abode being thus formed, it begins, ſoon after, to ſhorten itſelf, to ſwell, and to burſt its laſt ſkin, in order to aſſume the form of a chryſalis. This, in the beginning, appears of a yellowiſh colour, which heightens by degrees, till at laſt it is ſeen nearly red. Its exterior form plainly diſcovers all the veſtiges of the future winged inſect, all the fore-parts being diſtinctly ſeen; while behind, the animal ſeems as if wrapped in ſwaddling clothes.

The young May-bug continues in this ſtate for about three months longer, and it is not till the beginning of January, that the aurelia diveſts itſelf of all its impediments, and becomes a winged inſect, completely formed. Yet ſtill the animal is far from attaining its natural ſtrength, health, and appetite. It undergoes a kind of infant imbecility, and unlike moſt other inſects, that the inſtant they become flies are arrived at their ſtate of full perfection, the May-bug continues feeble and ſickly. Its colour is much brighter than in the perfect animal, all its parts are ſoft, and its voracious nature ſeems, for a while, to have entirely forſaken it. As the animal is very often found in this ſtate, it is ſuppoſed, by thoſe unacquainted with its real hiſtory, that the old ones, of the former ſeaſon, have buried themſelves for the winter, in order to reviſit the ſun the enſuing ſummer. But the fact is, the old one never ſurvives the ſeaſon but dies, like all the other winged tribe of inſects, from the ſeverity of cold in winter.

About the latter end of May, theſe inſects, after having lived for four years under ground, burſt from the earth, when the firſt mild evening invites them abroad. They are at that time ſeen riſing from their long impriſonment, from living only upon roots, and imbibing only the moiſture of the earth, to viſit the mildneſs of the ſummer air, to chooſe the ſweeteſt vegetables for their banquet, and to drink the dew of the evening. Wherever an attentive obſerver then walks abroad, he will ſee them burſting up before him in his pathway, like ghoſts on a theatre. He will ſee every part of the earth, that had its ſurface beaten into hardneſs, perforated by their egreſſion. When the ſeaſon is favourable for them, they are ſeen by myriads buzzing along, hitting againſt every object that intercepts their flight. The mid-day ſun, however, ſeems too powerful for their conſtitutions; they then lurk under the leaves and branches of ſome ſhady tree; but the willow ſeems particularly their moſt favourite food; there they lurk in cluſters, and ſeldom quit the tree till they have devoured all its verdure. In thoſe ſeaſons, which are favourable to their propagation, they are ſee in an evening as thick as flakes of ſnow, and hitting againſt every object with a ſort of capricious blindneſs. Their duration, however, is but ſhort, as they never ſurvive the ſeaſon. They begin to join ſhortly after they have been let looſe from their priſon, and when the female is impregnated, ſhe cautiouſly bores a hole in the ground, with an inſtrument fitted for that purpoſe, which ſhe is furniſhed with at the tail, and there depoſits her eggs, generally to the number of threeſcore. If the ſeaſon and the ſoil be adapted to their propagation, theſe ſoon multiply as already deſcribed, and go through the noxious ſtages of their contemptible exiſtence. This inſect, however, in its worm ſtate, though prejudicial to man, makes one of the chief repaſts of the feathered tribe, and is generally the firſt nouriſhment with which they ſupply their young. Rooks, and hogs, are particularly fond of theſe worms, and devour them in great numbers. The inhabitants of the county of Norfolk, ſome time ſince, went into the practice of deſtroying their rookeries, but in proportion, as they deſtroyed one plague, they were peſtered with a greater; and theſe inſects multiplied in ſuch an amazing abundance, as to deſtroy not only the verdure of the fields, but even the roots of vegetables not yet ſhot forth. One farm in particular was ſo injured by them in the year 1751, that the occupier was not able to pay his rent, and the landlord was not only content to loſe his income for that year, but alſo gave money for the ſupport of the farmer and his family. In Ireland they ſuffered ſo much by theſe inſects, that they came to a reſolution of ſetting fire to a wood, of ſome miles in extent, to prevent their miſchievous propagation.

Of all the beetle kind this is the moſt numerous, and therefore deſerves the chief attention of hiſtory. The numerous varieties of other kinds, might repay the curioſity of the diligent obſerver, but we muſt be content in general to obſerve, that in the great outlines of their hiſtory, they reſemble thoſe of which we have juſt been giving a deſcription; like them, all other beetles are bred from the egg, which is depoſited in the ground, or ſometimes, though ſeldom, in the barks of trees, they change into a worm; they ſubſiſt in that ſtate by living upon the roots of vegetables, or the ſucculent parts of the bark round them. They generally live a year at leaſt before they change into an aurelia; in that ſtate they are not entirely motionleſs, nor entirely ſwaddled up without form.

It would be tedious and endleſs to give a deſcription of all, and yet it would be an unpardonable omiſſion not to mention the particularities of ſome beetles, which are ſingular rather from their ſize, their manners, or their formation. That beetle which the Americans call the Tumble-dung, particularly demands our attention; it is all over of a duſky black, rounder than thoſe animals are generally found to be, and ſo ſtrong, though not much larger than the common black beetle, that if one of them be put under a braſs candleſtick, it will cauſe it to move backwards and forwards, as if it were by an inviſible hand, to the admiration of thoſe who are not accuſtomed to the ſight; but this ſtrength is given it for much more uſeful purpoſes than thoſe of exciting human curioſity, for there is no creature more laborious, either in ſeeking ſubſiſtence, or in providing a proper retreat for its young. They are endowed with ſagacity to diſcover ſubſiſtence by their excellent ſmelling, which directs them in flights to excrements juſt fallen from man or beaſt, on which they inſtantly drop, and fall unanimouſly to work in forming round balls or pellets thereof, in the middle of which they lay an egg. Theſe pellets, in September, they convey three feet deep in the earth, where they lie till the approach of ſpring, when the eggs are hatched the neſts burſt, and the inſects find their way out of the earth. They aſſiſt each other with indefatigable induſtry, in rolling theſe globular pellets to the place where they are to be buried. This they are to perform with the tail foremoſt, by raiſing up their hinder part, and ſhoving along the ball with their hind-feet. They are always accompanied with other beetles of a larger ſize, and of a more elegant ſtructure and colour. The breaſt of this is covered with a ſhield of crimſon colour, and ſhining like metal; the head is of the like colour, mixed with green, and on the crown of the head ſtands a ſhining black horn, bended backwards. Theſe are called the kings of the beetles, but for what reaſon is uncertain, ſince they partake of the ſame dirty drudgery with the reſt.

The Elephant-beetle is the largeſt of this kind hitherto known, and is found in South-America, particularly Guiana and Surinam, as well as about the river Oroonoko. It is of a black colour, and the whole body is covered with a very hard ſhell, full as thick and as ſtrong as that of a ſmall crab. Its length, from the hinder part to the eyes, is almoſt four inches, and from the ſame part to the end of the proboſcis, or trunk, four inches and three quarters. The tranſverſe diameter of the body is two inches and a quarter, and the breadth of each elytron, or caſe for the wings, is an inch and three-tenths. The antennæ, or feelers, are quite horny; for which reaſon the proboſcis or trunk is moveable at its inſertion into the head, and ſeems to ſupply the place of feelers. The horns are eight-tenths of an inch long, and terminate in points. The proboſcis is an inch and a quarter long, and turns upwards, making a crooked line, terminating in two horns, each of which is near a quarter of an inch long, but they are not perforated at the end like the proboſcis of other inſects. About four-tenths of an inch above the head, or that ſide next the body, is a prominence or ſmall horn, which if the reſt of the trunk were away, would cauſe this part to reſemble the horn of a rhinoceros. There is indeed a beetle ſo called, but then the horns or trunk has no fork at the end, though the lower horn reſembles this. The feet are all forked at the end, but not like lobſter's claws.

To this claſs we may alſo refer the Glow-worm, that little animal which makes ſuch a diſtinguiſhed figure in the deſcriptions of our poets. No two inſects can differ more than the male and female of this ſpecies from each other. The male is in every reſpect a beetle, having caſes to its wings, and riſing in the air at pleaſure; the female, on the contrary, has none, but is entirely a creeping inſect, and is obliged to wait the approaches of her capricious companion. The body of the female has eleven joints, with a ſhield breaſt-plate, the ſhape of which is oval; the head is placed over this, and is very ſmall, and the three laſt joints of her body are of a yellowiſh colour; but what diſtinguiſhes it from all other animals at leaſt in this part of the world, is the ſhining light which it emits by night, and which is ſuppoſed by ſome philoſophers to be an emanation which ſhe ſends forth to allure the male to her company. Moſt travellers who have gone through ſandy countries, muſt well remember the little, ſhining ſparks with which the ditches are ſtudded on each ſide of the road. If incited by curioſity to approach more nearly, he will find the light ſent forth by the glow-worm: if he ſhould keep the little animal for ſome time, its light continues to grow paler, and at laſt appears totally extinct. The manner in which this light is produced has hitherto continued inexplicable; it is probable the little animal is ſupplied with ſome electrical powers, ſo that by rubbing the joints of its body againſt each other, it thus ſupplies a ſtream of light, which, if it allures the male, as we are told, ſerves for very uſeful purpoſes.

The Cantharis is of the beetle kind, from whence come cantharides, well known in the ſhops by the name of Spaniſh flies, and for their uſe in bliſters. They have feelers like briſtles, flexible caſes to the wings, a breaſt pretty plain, and the ſides of the belly wrinkled. Cantharides differ from each other in their ſize, ſhape, and colour; thoſe uſed in the ſhops alſo do the ſame. The largeſt in theſe parts are about an inch long, and as much in circumference, but others are not above three quarters of an inch. Some are of a pure azure colour, others of pure gold, and others again, have a mixture of pure gold and azure colours; but they are all very brilliant, and extremely beautiful. Theſe inſects, as is well known, are of the greateſt benefit to mankind, making a part in many medicines conducive to human preſervation. They are chiefly natives of Spain, Italy, and Portugal; but they are to be met with alſo about Paris in the ſummer time, upon the leaves of the aſh, the poplar, and the roſe-tree, and alſo among wheat, and in meadows. It is very certain, that theſe inſects are fond of aſh-leaves, inſomuch that they will ſometimes ſtrip one of theſe trees quite bare. Some affirm, that theſe flies delight in ſweet-ſmelling herbs, and it is very certain, that they are fond of honey-ſuckles, lilach, and wild-cherry ſhrubs; but ſome that have ſought after them declare, they never could find them on elder-trees, nut-trees, and among wheat. We are told that the country people expect the return of theſe inſects every ſeven years. It is very certain, that ſuch a number of theſe inſects have been ſeen together in the air, that they appeared like ſwarms of bees; and that they have ſo diſagreeable a ſmell, that it may be perceived a great way off, eſpecially about ſun-ſet, though they are not ſeen at that time. This bad ſmell is a guide for thoſe who make it their buſineſs to catch them. When they are caught they dry them, after which they are ſo light, that fifty will hardly weigh a dram. Thoſe that gather them, tie them in a bag, or a piece of linen cloth, that has been well worn, and then they kill them with the vapours of hot vinegar, after which they dry them in the ſun, and keep them in boxes. Theſe flies, thus dried, being chymically analyſed, yield a great deal of volatile, cauſtic ſalt, mixed with a little oil, phlegm, and earth. Cantharides are penetrating, corroſive, and, applied to the ſkin, raiſe bliſters, from whence proceeds a great deal of ſeroſity. They are made uſe of both inwardly and outwardly. However, it is ſomewhat ſtrange that the effects of theſe flies ſhould fall principally upon the urinary paſſages, for though ſome authors have endeavoured to account for this, we are ſtill in the dark, for all they have ſaid amounts to no more, than that they affect theſe parts in a manner which may be very learnedly deſcribed, but very obſcurely comprehended.

An inſect of great, though, perhaps, not equal uſe in medicine, is that which is known by the name of the Kermes; it is produced in the excreſcence of an oak, called the berry-bearing ilex, and appears at firſt wrapt up in a membranaceous bladder, of the ſize of a pea, ſmooth and ſhining, of a browniſh red colour, and covered with very fine aſh-coloured powder. This bag teems with a number of reddiſh eggs or inſects, which being rubbed with the fingers pour out a crimſon liquor. It is only met with in warm countries in the months of May and June. In the month of April this inſect becomes of the ſize and ſhape of a pea, and its eggs ſome time after burſt from the womb, and ſoon turning worms, run about the branches and leaves of the tree. They are of two ſexes, and the females have been hitherto deſcribed; but the males are very diſtinct from the former, and are a ſort of ſmall flies like gnats, with ſix feet, of which the four forward are ſhort, and the two backward long, divided into four joints, and armed with three crooked nails. There are two feelers on the head, a line and a half long, which are moveable, ſtreaked, and articulated. The tail at the back part of the body, is half a line long and forked. The whole body is covered with two tranſparent wings, and they leap about in the manner of fleas. The harveſt of the kermes is greater or leſs in proportion to the ſeverity of the winter, and the women gather them before ſun-riſing, tearing them off with their nails; for fear there ſhould be any loſs from the hatching of the inſects. They ſprinkle them with vinegar, and lay them in the ſun to dry, where they acquire a red colour.

An inſect, perhaps, ſtill more uſeful than either of the former, is the Cochineal, which has been very variouſly deſcribed by authors; ſome have ſuppoſed it a vegetable excreſcence from the tree upon which it is found; ſome have deſcribed it as a louſe, ſome as a bug, and ſome as a beetle. As they appear in our ſhops when brought from America, they are of an irregular ſhape, convex on one ſide, and a little concave on the other; but are both marked with tranſverſe ſtreaks or wrinkles. They are of a ſcarlet colour within, and without of a blackiſh red, and ſometimes of a white, reddiſh, or aſh-colour, which are accounted the beſt, and are brought to us from Mexico. The cochineal inſect is of an oval form, of the ſize of a ſmall pea, with ſix feet, and a ſnout or trunk. It brings forth its young alive, and is nouriſhed by ſucking the juice of the plant. Its body conſiſts of ſeveral rings, and when it is once fixed on the plant, it continues immoveable, being ſubject to no change. Some pretend there are two ſorts, the one domeſtic, which is beſt, and the other wild, that is of a vivid colour; however, they appear to be the ſame, only with this difference, that the wild feeds upon uncultivated trees, without any aſſiſtanee, whereas the domeſtic is carefully at a ſtated ſeaſon removed to cultivated trees, where it feeds upon a purer juice. Thoſe who take care of theſe inſects, place them on the prickly pear-plant in a certain order, and are very induſtrious in defending them from other inſects; for if any other kind come among them, they take care to bruſh them off with foxes' tails. Towards the end of the year, when the rains and cold weather are coming on, which are fatal to theſe inſects, they take off the leaves or branches covered with cochineal, that have not attained their utmoſt degree of perfection, and keep them in their houſes till winter is paſt. Theſe leaves are very thick and juicy, and ſupply them with ſufficient nouriſhment, while they remain within doors. When the milder weather returns, and theſe animals are about to exclude their young, the natives make them neſts, like thoſe of birds, but leſs, of tree-moſs, or ſoft hay, or the down of cocoa-nuts, placing twelve in every neſt. Theſe they fix on the thorns of the prickly pear-plant, and in three or four days time they bring forth their young, which leave their neſts in a few days, and creep upon the branches of the plant, till they find a proper place to reſt in, and take in their nouriſhment; and until the females are fecundated by the males, which, as in the former tribe, differ very widely, from the females being winged inſects, whereas the others only creep, and are at moſt ſtationary. When they are impregnated, they produce a new offspring, ſo that the propagator has a new harveſt thrice a-year. When the native Americans have gathered the cochineal, they put them into holes in the ground, where they kill them with boiling water, and afterwards dry them in the ſun, or in an oven, or lay them upon hot plates. From the various methods of killing them, ariſe the different colours which they appear in when brought to us. While they are living, they ſeem to be ſprinkled over with a white powder, which they loſe as ſoon as the boiling water is poured upon them. Thoſe that are dried upon hot plates are the blackeſt. What we call the cochineal are only the females, for the males are a ſort of a fly as already obſerved in the kermes. They are uſed both for dyeing and medicine, and are ſaid to have much the ſame virtue as the kermes, though they are now ſeldom uſed alone, but are mixed with other things for the ſake of the colour.

I ſhall end this account of the beetle tribe with the hiſtory of an animal which cannot properly be ranked under this ſpecies, and yet which cannot be more methodically ranged under any other. This is the inſect that forms and reſides in the gall-nut, the ſpoils of which are converted to ſuch uſeful purpoſes. The gall-inſects are bred in a ſort of bodies adhering to a kind of oak in Aſia, which differ with regard to their colour, ſize, roughneſs, ſmoothneſs, and ſhape, and which we call galls. They are not fruit, as ſome have imagined, but preternatural tumours, owing to the wounds given to the buds, leaves, and twigs of the tree, by a kind of inſects that lay their eggs within them. This animal is furniſhed with an implement, by which the female penetrates into the bark of the tree, or into that ſpot which juſt begins to bud, and there ſheds a drop of corroſive fluid into the cavity. Having thus formed a receptacle for her eggs, ſhe depoſits them in the place, and dies ſoon after. The heart of the bud being thus wounded, the circulation of the nutritive juice is interrupted and the fermentation thereof, with poiſon injected by the fly, burns the parts adjacent, and then alters the natural colour of the plant. The juice or ſap turned back from its natural courſe, extravaſates and flows round the egg. After which it ſwells and dilates by the aſſiſtance of ſome bubbles of air, which get admiſſion through the pores of the bark, and which run in the veſſels with the ſap. The external coat of this excreſcence is dried by the air, and grows into a figure which bears ſome reſemblance to the bow of an arch, or the roundneſs of a kernel. This little ball receives its nutriment, growth, and vegetation as the other parts of the tree by ſlow degrees, and is what we call the *gall-nut*. The worm that is hatched under this ſpacious vault, finds in the ſubſtance of the ball, which is as yet very tender, a ſubſiſtence ſuitable to its nature; gnaws and digeſts it till the time comes for its transformation to a nymph, and from that ſtate of exiſtence changes into a fly. After this the inſect, perceiving itſelf duly provided with all things requiſite, diſengages itſelf ſoon from its confinement, and takes its flight into the open air. The caſe however, is not ſimilar with reſpect to the gall-nut, that grows in autumn. The cold weather frequently comes on before the worm is tranſformed into a fly, or before the fly can pierce through its incloſure. The nut falls with the leaves, and although you may imagine that the fly which lies within is loſt, yet in reality it is not ſo; on the contrary, its being covered up ſo cloſe, is the means of its preſervation. Thus it ſpends the winter in a warm houſe, where every crack and cranny of the nut is well ſtopped up; and lies buried as it were under a heap of leaves, which preſerves it from the injuries of the weather. This apartment, however, though ſo commodious a retreat in the winter, is a perfect priſon in the ſpring. The fly, rouzed out of its lethargy by the firſt heats, breaks its way through, and ranges where it pleaſes. A very ſmall aperture is ſufficient, ſince at this time the fly is but a diminutive creature. Beſides, the ringlets whereof its body is compoſed, dilate, and become pliant in the paſſage.

CHAP. VII.

OF THE GNAT AND TIPULA.

THERE are two inſects which entirely reſemble each other in their form, and yet widely differ in their habits, manners, and propagation. Thoſe who have ſeen the tipula, or long-legs, and the larger kind of knat, have moſt probably miſtaken the one for the other, they have often accuſed the tipula, a harmleſs inſect, of depredations made by the gnat, and the innocent have ſuffered for the guilty; indeed the differences in their form are ſo very minute, that it often requires the aſſiſtance of a microſcope to diſtinguiſh the one from the other: they are both mounted on long legs, both furniſhed with two wings and a ſlender body; their heads are large, and they ſeem to be hump-backed; the chief and only difference, therefore, is, that the tipula wants a trunk, while the gnat has a large one, which it often exerts to very miſchievous purpoſes. The tipula is a harmleſs, peaceful inſect, that offers injury to nothing; the gnat is ſanguinary and predaceous, ever ſeeking out for a place in which to bury its trunk, and pumping up the blood from the animal in large quantities.

The gnat proceeds from a little worm, which is uſually ſeen at the bottom of ſtanding waters. The manner in which the inſect lays its eggs is particularly curious; after having laid the proper number on the ſurface of the water, it ſurrounds them with a kind of unctuous matter, which prevents them from ſinking, but at the ſame time faſtens them with a thread to the bottom, to prevent their floating away, at the mercy of every breeze, from a place, the warmth of which is proper for their production, to any other, where the water may be too cold, or the animals its enemies too numerous. Thus the inſects, in their egg ſtate, reſemble a buoy, which is fixed by an anchor. As they come to maturity they ſink deeper, and at laſt, when they leave the egg as worms they creep at the bottom. They now make themſelves lodgments of cement, which they faſten to ſome ſolid body at the very bottom of the water, unleſs, by accident, they meet with a piece of chalk, which being of a ſoft and pliant nature, gives them an opportunity of ſinking a retreat for themſelves, where nothing but the claws of a cray-fiſh can poſſibly moleſt them. The worm afterwards changes its form. It appears with a large head, and a tail inveſted with hair, and moiſtened with an oleaginous liquor, which ſhe makes uſe of as a cork, to ſuſtain her head in the air, and her tail in the water, and to tranſport her from one place to another. When the oil with which her tail is moiſtened begins to grow dry, ſhe diſcharges out of her mouth an unctuous humour, which ſhe ſheds all over her tail, by virtue whereof, ſhe is enabled to tranſport herſelf where ſhe pleaſes, without being either wet or any ways incommoded by the water. The gnat, in her ſecond ſtate, is properly ſpeaking, in her form of a nymph, which is an introduction, or entrance into new life. In the firſt place, ſhe diveſts herſelf of her ſecond ſkin; in the next ſhe reſigns her eyes, her antennæ, and her tail; in ſhort, ſhe actually ſeems to expire. However, from the ſpoils of the amphibious animal, a little winged inſect cuts the air, whoſe every pa rtis active to the laſt degree, and whoſe whole ſtructure is the juſt object of our admiration. Its little head is adorned with a plume of feathers, and its whole body inveſted with ſcales and hair, to ſecure it from any wet or duſt. She makes trial of the activity of her wings, by rubbing them either againſt her body, or her broad ſide-bags, which keep her in an equilibrium. The furbelow, or little border of fine feathers, which graces her wings is very curious, and ſtrikes the eye in the moſt agreeable manner. There is nothing, however, of great importance to the gnat, that her trunk, and that weak implement may juſtly be deemed one of Nature's maſter-pieces. It is ſo very ſmall, that the extremity of it can ſcarcely be diſcerned through the beſt microſcope that can be procured. That part which is at firſt obvious to the eye, is nothing but a long ſcaly ſheath under the throat. At near the diſtance of two-thirds of it, there is an aperture, through which the inſect darts out four ſtings, and afterwards retracts them. One of which, however ſharp and active it may be, is no more than the caſe in which the other three lie concealed, and run in a long groove. The ſides of theſe ſtings are ſharpened like two-edged ſwords, they are likewiſe barbed, and have a vaſt number of cutting teeth towards the point, which turns up like a hook, and is fine beyond expreſſion. When all theſe darts are ſtuck into the fleſh of animals, ſometimes one after another, and ſometimes all at once, the blood and humours of the adjacent parts muſt unavoidably be extravaſated; upon which a tumour muſt conſequently enſue, the little orifice whereof is cloſed up by the compreſſion of the external air. When the gnat, by the point of her caſe, which ſhe makes uſe of as a tongue, has taſted any fruit, fleſh, or juice, that ſhe has found out; if it be a fluid, ſhe ſucks it up, without playing her darts into it; but in caſe ſhe finds the leaſt obſtruction by any fleſh whatever, ſhe exerts her ſtrength, and pierces through it, if poſſibly ſhe can. After this ſhe draws back her ſtings into their ſheath, which ſhe applies to the wound in order to extract, as through a reed, the juices which ſhe finds incloſed. This is the implement with which the gnat performs her work in the ſummer, for during the winter ſhe has no manner of occaſion for it. Then ſhe ceaſes to eat, and ſpends all that tedious ſeaſon either in quarries or in caverns, which ſhe abandons at the return of ſummer, and flies about in ſearch after ſome commodious ford, or ſtanding water, where ſhe may produce her progeny, which would be ſoon waſhed away and loſt, by the too rapid motion of any running ſtream. The little brood are ſometimes ſo numerous, that the very water is tinged according to the colour of the ſpecies, as green, if they be green, and of a ſanguine hue, if they be red.

Theſe are circumſtances ſufficiently extraordinary in the life of this little animal, but it offers ſomething ſtill more curious in the method of its propagation. However ſimilar inſects of the gnat kind are in their appearance, yet they differ widely from each other in the manner in which they are brought forth, for ſome are oviparous, and are produced from eggs, ſome are viviparous, and come forth in their moſt perfect form; ſome are males, and unite with the female; ſome are females, requiring the impregnation, of the male; ſome are of neither ſex, yet ſtill produce young, without any copulation whatſoever. This is one of the ſtrangeſt diſcoveries in all Natural Hiſtory! A gnat ſeparated from the reſt of its kind, and incloſed in a glaſs veſſel, with air ſufficient to keep it alive, ſhall produce young, which alſo, when ſeparated from each other, ſhall be the parents of a numerous progeny. Thus, down for five or ſix generations do theſe extraordinary animals propagate without the uſe of copulation, without any congreſs between the male and the female, but in the manner of vegetables, the young burſting from the body of their parents, without any previous impregnation. At the ſixth generation however, their propagation ſtops; the gnat no longer produces its like, from itſelf alone, but it requires the acceſs of the male to give it another ſucceſſion of fecundity.

The gnat of Europe gives but little uneaſineſs; it is ſometimes heard to hum about our beds at night, and keeps off the approaches of ſleep by the apprehenſion it cauſes; but it is very different in the ill-peopled regions of America, where the waters ſtagnate, and the climate is warm, and where they are produced in multitudes beyond expreſſion. The whole air is there filled with clouds of thoſe famiſhed inſects and they are found of all ſizes, from ſix inches long, to a minuteneſs that even requires the microſcope to have a diſtinct perception of them. The warmth of the mid-day ſun is too powerful for their conſtitutions; but when the evening approaches, neither art nor flight can ſhield the wretched inhabitants from their attacks, though millions are deſtroyed, ſtill millions more ſucceed, and produce unceaſing torments. The native Indians, who anoint their bodies with oil, and who have from their infancy been uſed to their depredations, find them much leſs inconvenient than thoſe who are newly arrived from Europe; they ſleep in their cottages covered all over with thouſands of the gnat kind upon their bodies, and yet do not ſeem to have their ſlumbers interrupted by their cruel devourers. If a candle happens to be lighted in one of thoſe places, a cloud of inſects at once light upon the flame, and extinguiſh it; they are therefore obliged to keep their candles in glaſs lanthorns; a miſerable expedient to prevent an unceaſing calamity.

BOOK V.

OF THE ZOOPHYTES.

CHAP. I.

OF ZOOPHYTES IN GENERAL.

WE are now come to the laſt link in the chain of Animated Nature, to a claſs of beings ſo confined in their powers, and ſo defective in their formation, that ſome hiſtorians have been at a loſs whether to conſider them as a ſuperior rank of vegetables, or the humbleſt order of the animated tribe. In order therefore to give them a denomination, agreeable to their exiſtence, they have been called Zoophytes, a name implying vegetable nature indued with animal life; and indeed, in ſome the marks of the animal are ſo few, that it is difficult to give their place in Nature with preciſion, or to tell whether it is a plant or an inſect that is the object of our conſideration.

Sould it be aſked what it is that conſtitutes the difference between animal and vegetable life, what it is that lays the line that ſeparates thoſe two great kingdoms from each other, it would be difficult, perhaps we ſhould find it impoſſible, to return an anſwer. The power of motion cannot form this diſtinction, ſince ſome vegetables are poſſeſſed of motion, and many animals are totally without it. The ſenſitive plant has obviouſly a greater variety of motions than the oyſter or the pholas. The animal that fills the acornſhell is immoveable, and can only cloſe its lid to defend itſelf from external injury, while the flower, which goes by the name of the fly-trap, ſeems to cloſe upon the flies that light upon it and that attempt to rifle it of its honey. The animal in this inſtance, ſeems to have ſcarce a power of ſelf defence; the vegetable not only guards its poſſeſſions, but ſeizes upon the robber that would venture to invade them.

In like manner, the methods of propagation give no ſuperiority to the lower rank of animals. On the contrary, vegetables are frequently produced more conformably to the higher ranks of the creation, and though ſome plants are produced by cuttings from others, yet the general manner of propagation is from ſeeds, laid in the womb of the earth, where they are hatched into the ſimilitude of the parent plant or flower. But a moſt numerous tribe of animals have lately been diſcovered, which are propagated by cuttings, and this in ſo extraordinary a manner, that, though the original inſect be divided into a thouſand parts, each, however ſmall, ſhall be formed into an animal, entirely reſembling that which was at firſt divided; in this reſpect, therefore, certain races of animals ſeem to fall beneath vegetables, by their more imperfect propagation.

What, therefore, is the diſtinction between them—or are the orders ſo intimately blended as that it is impoſſible to mark the boundaries of each? To me it would ſeem, that all animals are poſſeſſed of one power, of which vegetables are totally deficient; I mean either the actual ability, or an awkward attempt at ſelf-preſervation. However vegetables may ſeem poſſeſſed of this important quality, yet it is with them but a mechanical impulſe, reſembling the raiſing one end of the lever, when you depreſs the other; the ſenſitive plant contracts and hangs its leaves indeed, when touched, but this motion no way contributes to its ſafety; the fly-trap flower acts entirely in the ſame manner; and though it ſeems to ſeize the little animal, that comes to annoy it, yet, in reality, only cloſes mechanically upon it, and this incloſure neither contributes to its preſervation nor its defence. But it is very different with inſects, even of the loweſt order; the earth-worm not only contracts, but hides itſelf in the earth, and eſcapes with ſome ſhare of ſwiftneſs from its purſuers. The polypus hides its horns; the ſtar-fiſh contracts its arms, upon the appearance even of diſtant dangers; they not only hunt for their food, but provide for their ſafety, and however imperfectly they may be formed, yet ſtill they are in reality, placed many degrees above the higheſt vegetable of the earth, and are poſſeſſed of many animal functions, as well as thoſe that are more elaborately formed.

But though theſe be ſuperior to plants, they are very far beneath their animated fellows of exiſtence. In the claſs of zoophytes, we may place all thoſe animals, which may be propagated by cuttings, or in other words which, if divided into two or more parts, each part in time, becomes a ſeparate and perfect animal; the head ſhoots forth a tail, and on the contrary, the tail produces a head; ſome of theſe will bear dividing but into two parts, ſuch is the earthworm; ſome may be divided into more than two, and of this kind are many of the ſtar-fiſh; others ſtill may be cut into a thouſand parts, each becoming a perfect animal; they may be turned inſide out, like the finger of a glove, they may be moulded into all manner of ſhapes, yet ſtill their vivacious principle remains, ſtill every ſingle part becomes perfect in its kind, and after a few days exiſtence, exhibits all the arts and induſtry of its contemptible parent! We ſhall, therefore, divide zoophytes according to their ſeveral degrees of perfection, namely, into worms, ſtar-fiſh, and polypi; contenting ourſelves with a ſhort review of thoſe nauſeous and deſpicable creatures, that excite our curioſity chiefly by their imperfections; it muſt not be concealed, however, that much has of late been written on this part of natural hiſtory. A new mode of animal production, could not fail of exciting not only the curioſity, but the aſtoniſhment of every philoſopher; many found their favourite ſyſtems totally overthrown by the diſcovery, and it was not without a wordy ſtruggle, that they gave up what had formerly been their pleaſure and their pride. At laſt, however, conviction became too ſtrong for argument, and a queſtion, which owed its general ſpread rather to its novelty, than to its importance, was given up in favour of the new diſcovery.

CHAP. II.

OF WORMS.

THE firſt in the claſs of zoophytes, are animals of the worm kind, which being entirely deſtitute of feet, trail themſelves along upon the ground, and find themſelves a retreat under the earth, or in the water. As theſe, like ſerpents, having a creeping motion, ſo both, in general, go under the common appellation of reptiles; a loathſome, noxious, malignant tribe, to which man by nature, as well as by religion, has the ſtrongeſt antipathy. But though worms, as well as ſerpents, are moſtly without feet, and have been doomed to creep along the earth on their bellies, yet their motions are very different. The ſerpent, as has been ſaid before, having a back bone, which it is incapable of contracting, bends its body into the form of a bow, and then ſhoots forward from the tail; but it is very different with the worm, which has a power of contracting or lengthening itſelf at will. There is a ſpiral muſcle, that runs round its whole body, from the head to the tail, ſomewhat reſembling a wire wound round a walking-cane, which, when ſlipped off, and one end extended and held faſt, will bring the other nearer to; in this manner the earth-worm, having ſhot out, or extended its body, takes hold by the ſlime of the fore part of its body, and ſo contracts and brings forward the hinder part; in this manner it moves onward, not without great effort, but the occaſions for its progreſſive motion are few.

As it is deſigned for living under the earth, and leading a life of obſcurity, ſo it ſeems tolerably adapted to its ſituation. Its body is armed with ſmall ſtiff ſharp burrs or prickles, which it can erect or depreſs at pleaſure; under the ſkin there lies a ſlimy juice, to be ejected as occaſion requires, at certain perforations, between the rings of the muſcles, to lubricate its body, and faciliate its paſſage into the earth. Like moſt other inſects, it hath breathing-holes along the back, adjoining each ring; but it is without bones, without eyes, without ears, and, properly, without feet. It has a mouth, and alſo an alimentary canal, which runs along to the very point of the tail. In ſome worms, however, particularly ſuch as are found in the bodies of animals, this canal opens towards the middle of the belly, at ſome diſtance from the tail. The inteſtines of the earth-worm, are always found filled with a very fine earth, which ſeems to be the only nouriſhment theſe animals are capable of receiving.

The animal is entirely without brain, but near the head is placed the heart, which is ſeen to beat with a very diſtinct motion, and round it are the ſpermatic veſſels, forming a number of little globules, containing a milky fluid, which have an opening into the belly, not far from the head: they are alſo often found to contain a number of eggs, which are laid in the earth, and are hatched in twelve or fourteen days into life, by the genial warmth of their ſituation; like ſnails, all theſe animals unite in themſelves, both ſexes at once; the reptile that impregnates, being impregnated in turn: few that walk out, but muſt have obſerved them, with their heads laid againſt each other, and ſo ſtrongly attached, that they ſuffer themſelves to be trod upon.

When the eggs are laid in the earth, which, in about fourteen days, as has been ſaid, are hatched into maturity, the young ones come forth very ſmall, but perfectly formed, and ſuffer no change during their exiſtence: how long their life continues is not well known, but it certainly holds for more than two or three ſeaſons. During the winter, they bury themſelves deeper in the earth, and ſeem, in ſome meaſure, to ſhare the general torpidity of the inſect tribe. In ſpring, they revive with the reſt of Nature, and on thoſe occaſions, a moiſt or dewy evening brings them forth from their retreats, for the univerſal purpoſe of continuing their kind. They chiefly live in a light, rich, and fertile ſoil, moiſtened by dews or accidental ſhowers, but avoid thoſe places where the water is apt to lie on the ſurface of the earth, or where the clay is too ſtiff for their eaſy progreſſion under ground.

Helpleſs as they are formed, yet they ſeem very vigilant in avoiding thoſe animals that chiefly make them their prey; in particular, the mole, who feeds entirely upon them beneath the ſurface, and who ſeldom ventures, from the dimneſs of its ſight, into the open air; him they avoid, by darting up from the earth, the inſtant they feel the ground move; and fiſhermen, who are well acquainted with this, take them in what numbers they chooſe, by ſtirring the earth, where they expect to find them. They are alſo driven from their retreats under ground, by pouring bitter or acrid water thereon, ſuch as that water in which green walnuts have been ſteeped, or a lye made of pot-aſhes.

Such is the general outline of the hiſtory of theſe reptiles, which, as it ſhould ſeem, degrades them no way beneath the rank of other animals of the inſect creation; but we now come to a part of their hiſtory, which proves the imperfection of their organs, from the eaſineſs with which theſe little machines may be damaged and repaired again. It is well known in mechanics, that the fineſt and moſt complicated inſtruments are the moſt eaſily put out of order, and the moſt difficultly ſet aright; the ſame alſo obtains in the animal machine. Man, the moſt complicated machine of all others, whoſe nerves are more numerous, and powers of action more various, is moſt eaſily deſtroyed: he is ſeen to die under wounds which a quadruped or a bird could eaſily ſurvive; and as we deſcend gradually to the lower ranks, the ruder the compoſition, the more difficult it is to diſarrange it. Some animals live without their limbs, and often are ſeen to reproduce them; ſome are ſeen to live without their brain for many week together; caterpillars continue to increaſe and grow large, though all the nobler organs are entirely deſtroyed within; ſome animals continue to exiſt, though cut in two, their nobler parts preſerving life, while the others periſh that were cut away; but the earth worm, and all the zoophyte tribe, continue to live in ſeparate parts, and one animal, by the means of cutting, is divided into two diſtinct exiſtences, ſometimes into a thouſand!

There is no phænomenon in all Natural Hiſtory more aſtoniſhing than this, that man, at pleaſure, ſhould have a kind of creative power, and out of one life make two, each completely formed, with all its apparatus and functions, each with its perceptions, and powers of motion and ſelf-preſervation, each as complete in all reſpects as that from which it derived its exiſtence, and equally enjoying the humble gratifications of its nature.

When Des Cartes firſt ſtarted the opinion, that brutes were machines, the diſcovery of this ſurpriſing propagation was unknown, which might, in ſome meaſure, have ſtrengthened his fanciful theory. What is life, in brutes, he might have ſaid, or where does it reſide? In ſome we find it ſo diffuſed, that every part ſeems to maintain a vivacious principle, and the ſame animal appears poſſeſſed of a thouſand diſtinct irrational ſouls at the ſame time. But let us not, he would ſay, give ſo noble a name to ſuch contemptible powers, but rank the vivifying principle in theſe with the ſap that riſes in vegetables, or the moiſture that contracts a cord, or the heat that puts water into motion! Nothing, in fact, deſerves the name of ſoul, but that which reaſons, that which underſtands, and by knowing God, receives the mark of its currency, and is minted with the impreſſion of its great Creator!

Such might have been the ſpeculations of this philoſopher: However to leave theory, it will be ſufficient to ſay that we owe the firſt diſcovery of this power of reproduction in animals to Mr. Trembley, who firſt obſerved it in the polypus, and after him, Spalanzani and others found it taking place in the earth-worm, the ſea-worm, and ſeveral other ill-formed animals of a like kind, which were ſuſceptible of this new mode of propagation. This laſt philoſopher, has tried ſeveral experiments upon the earth-worm, many of which ſucceeded according to his expectation; every earth-worm, however, did not retain the vivacious principle with the ſame obſtinacy; ſome, when cut in two, were entirely deſtroyed; others ſurvived only the nobler part; and while the head was living the tail entirely periſhed, and a new one was ſeen to burgeon from the extremity. But what was moſt ſurpriſing of all, in ſome, particularly in the ſmall red-headed earth-worm, both extremities ſurvived the operation; the head produced a tail with the anus, the inteſtines, the annular muſcles, and the prickly beards; the tail part, on the other hand, was ſeen to ſhoot forth the nobler organs, and in leſs than the ſpace of three months ſent forth a head, heart, with all the apparatus and inſtruments of generation. This part, as may eaſily be ſuppoſed, was produced much more ſlowly than the former, a new head taking above three or four months for its completion, a new tail being ſhot forth in leſs than as many weeks.—Thus two animals, by diſſection, were made out of one, each with their ſeparate appetites, each endued with life and motion, and ſeemingly as perfect as that ſingle animal from whence they derived their origin.

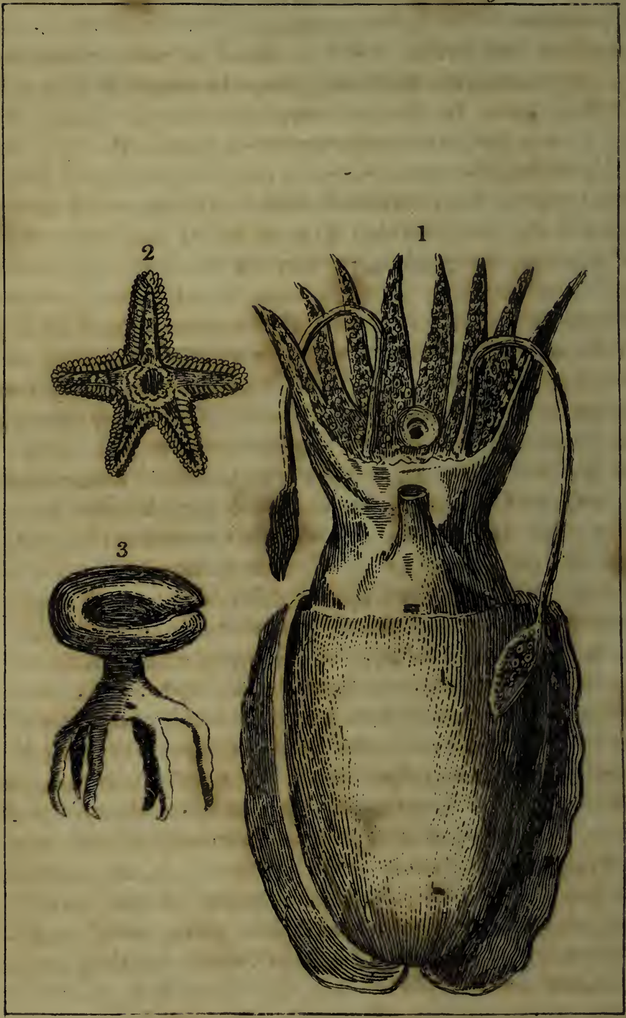
What was performed upon the earth-worm, was found to obtain alſo in many other of the vermicular ſpecies. The ſea-worm, the white water-worm, and many of thoſe little worms with feelers, found at the bottom of dirty ditches;

in all theſe the nobler organs are of ſuch little uſe, that if taken away, the animal does not ſeem to feel the want of them; it lives in all its parts, and in every part, and by a ſtrange paradox in Nature, the moſt uſeleſs and contemptible life is of all others the moſt difficult to deſtroy.

CHAP. III.

OF THE STAR-FISH.

THE next order of zoophytes is that of the ſtar-fiſh, a numerous tribe, ſhapeleſs and deformed, aſſuming at different times different appearances. The ſame animal that now appears round like a ball, ſhortly after flattens as thin as a plate. All of this kind are formed of a ſemi-tranſparent gelatinous ſubſtance, covered with a thin membrane, and, to an inattentive ſpectator, often appear like a lump of inanimate jelly, floating at random upon the ſurface of the ſea, or thrown by chance on ſhore at the departure of the tide. But upon a more minute inſpection, they will be found poſſeſſed of life and motion; they will be found to ſhoot forth their arms in every direction, in order to ſeize upon ſuch inſects as are near, and to devour them with great rapacity. Worms, the ſpawn of fiſh, and even muſcles themſelves, with their hard reſiſting ſhell, have been found in the ſtomachs of theſe voracious ainmals; and what is very extraordinary, though the ſubſtance of their own bodies be almoſt as ſoft as water, yet they are no way injured by ſwallowing theſe ſhells, which are almoſt of a ſtony hardneſs. They increaſe in ſize as all other animals do. In ſummer, when the water of the ſea is warmed by the heat of the ſun, they float upon the ſurface, and in the dark they ſend forth a kind of ſhining light reſembling that of phoſphorus.—Some have given theſe animals the name of ſea-nettles, becauſe they burn the hands of thoſe that touch them, as nettles are found to do. They are often ſeen faſtened to the rocks, and to the largeſt ſea-ſhells, as if to derive their nouriſhment from them. If they be taken and put into ſpirit of wine, they will continue for many years entire, but



1 The Cuttle Fish
2 The Star Fish
3 The Sea Nettle

if they be left to the influence of the air, they are in leſs than four and twenty hours melted down into limpid and offenſive water.

In all of this ſpecies, none are found to poſſeſs a vent for their excrements, but the ſame paſſage by which they devour their food, ſerves for the ejection of their fæces. Theſe animals, as was ſaid, take ſuch a variety of figures, that it is impoſſible to deſcribe them under one determinate ſhape; but in general their bodies reſembled a truncated cone, whoſe baſe is applied to the rock to which they are found uſually attached. Tho' generally tranſparent, yet they are found of different colours, ſome inclining to green, ſome to red, ſome to white, and ſome to brown. In ſome, their colours appear diffuſed over the whole ſurface, in ſome they are often ſtreaked, and in others often ſpotted. They are poſſeſſed of a very ſlow progreſſive motion, and in fine weather they are continually ſeen, ſtretching out and fiſhing for their prey. Many of them are poſſeſſed of a number of long, ſlender filaments, in which they entangle any ſmall animals they happen to approach, and thus draw them into their enormous ſtomachs, which fill the whole cavity of their bodies. The harder ſhells continue for ſome weeks indigeſted, but, at length, they undergo a kind of maceration in the ſtomach, and become a part of the ſubſtance of the animal itſelf. The indigeſtible parts, are returned by the ſame aperture by which they were ſwallowed, and then the ſtar-fiſh begins to fiſh for more. Theſe alſo may be cut in pieces, and every part will ſurvive the operation; each becoming a perfect animal, endued with its natural rapacity. Of this tribe, the number is various, and the deſcription of each would be tedious and uninſtructing; the manners and nature of all, are nearly as deſcribed; but I will juſt make mention of one creature, which, though not properly belonging to this claſs, yet is ſo nearly related, that the paſſing it in ſilence would be an unpardonable omiſſion.

Of all other animals, the cuttle-fiſh, though in ſome reſpect ſuperior to this tribe, poſſeſſes qualities the moſt extraordinary. It is about two feet long, covered with a very thin ſkin, and its fleſh compoſed of a gelatinous ſubſtance, which, however, within-ſide, is ſtrengthened by a ſtrong bone, of which ſuch great uſe is made by the goldſmiths. It is poſſeſſed of eight arms, which it extends, and which are probably of ſervice to it in fiſhing for its prey; while in life, it is capable of lengthening or contracting theſe at pleaſure; but when dead they contract and loſe their rigidity. They feed upon ſmall fiſh, which they ſeize with their arms; and they are bred from eggs, which are laid upon the weeds along the ſea-ſhore.

The cuttle-fiſh is found along many of the coaſts of Europe, but are not eaſily caught, from a contrivance with which they are furniſhed by Nature; this is a black ſubſtance of the colour of ink, which is contained in a bladder generally on the left-ſide of the belly, and which is ejected in the manner of an excrement from the anus. Whenever, therefore, this fiſh is purſued, and when it finds a difficulty of eſcaping, it ſpurts forth a great quantity of this black liquor, by which the waters are totally darkened, and then it eſcapes, by lying cloſe at the bottom. In this manner the creature finds its ſafety, and men find ample cauſe for admiration, from the great variety of ſtratagems with which creatures are endued for their peculiar preſervation.

CHAP. IV.

OF THE POLYPUS.

THOSE animals which we have deſcribed in the laſt chapter, are variouſly denominated. They have been called the Star-fiſh, Sea-nettles, and Sea-polypi. This laſt name has been peculiarly aſcribed to them by the ancients, becauſe of the number of feelers or feet of which they are all poſſeſſed, and with which they have a ſlow, progreſſive motion; but the moderns have given the name of Polypus, to a reptile that lives in freſh-water, by no means ſo large or obſervable. Theſe are found at the bottom of wet ditches, or attached to the under ſurface of the broad-leafed plants that grow and ſwim on the waters. The ſame difference holds between theſe and the ſea-water polypus, as between all the productions of the ſea, and of the land and the ocean. The marine vegetables and animals grow to a monſtrous ſize. The eel, the pike, or the bream of freſh-waters, is but ſmall; but in the ſea they grow to an enormous magnitude. The herbs of the field are at moſt but a few feet high; thoſe of the ſea often ſhoot forth a ſtalk of a hundred. It is ſo between the polypi of both elements. Thoſe of the ſea are found from two feet in length to three or four, and Pliny has even deſcribed one, the arms of which were no leſs than thirty feet long. Thoſe in freſh waters, however, are comparatively minute, at their utmoſt ſize, ſeldom above three parts of an inch long, and when gathered up into their uſual form, not above a third even of thoſe dimenſions.

It was upon theſe minute animals, that the power of diſſection was firſt tried in multiplying their numbers. They had been long conſidered as little worthy the attention of obſervers, and were conſigned to that neglect in which thouſands of minute ſpecies of inſects remain to this very day.—It is true indeed, that Reaumur obſerved, claſſed, and named them. By contemplating their motions, he was enabled diſtinctly to pronounce on their being of the animal, and not of the vegetable kingdom; and he called them polypi, from their great reſemblance to thoſe larger ones that were found in the ocean. Still, however, their properties were neglected, and their hiſtory unknown.

Mr. Trembley was the perſon to whom we owe the firſt diſcovery of the amazing properties and powers of this little vivacious creature. He divided this claſs of animals into four different kinds; into thoſe inclining to green, thoſe of a browniſh caſt, thoſe of a fleſh-colour, thoſe which he calls the *polype de panache*. The differences of ſtructure in theſe, as alſo of colour are obſervable enough; but the manner of their ſubſiſting, of ſeizing their prey, and of their propagation is nearly the ſame in all.

Whoever has looked with care into the bottom of a wet ditch when the water is ſtagnant, and the ſun has been powerful, may remember to have ſeen many little tranſparent lumps of jelly, about the ſize of a pea, and flatted on one ſide; ſuch alſo as have examined the under ſide of the broad-leafed weeds that grow on the ſurface of the water, muſt have obſerved them ſtudded with a number of theſe little jelly-like ſubſtances, which were probably then diſregarded, becauſe their nature and hiſtory were unknown.—Theſe little ſubſtances, however, were no other than living polypi gathered up into a quieſcent ſtate, and ſeemingly inanimate, becauſe either undiſturbed, or not excited by the calls of appetite to action. When they are ſeen exerting themſelves they put on a very different appearance from that when at reſt; to conceive a juſt idea of their figure, we may ſuppoſe the finger of a glove cut off at the bottom; we may ſuppoſe alſo ſeveral threads or horns planted round the edge like a fringe. The hollow of this finger will give us an idea of the ſtomach of the animal, the threads iſſuing forth from the edges may be conſidered as the arms or feelers, with which it hunts for its prey. The animal at its greateſt extent, is ſeldom ſeen above an inch and a half long, but it is much ſhorter when it is contracted and at reſt; it is furniſhed neither with muſcles nor rings, and its manner of lengthening or contracting itſelf, more reſembles that of the ſnail, than worms, or any other inſect. The polypus contracts itſelf more or leſs, in proportion as it is touched, or as the water is agitated in which they are ſeen. Warmth animates them, and cold benumbs them; but it requires a degree of cold approaching congelation before they are reduced to perfect inactivity; thoſe of an inch have generally their arms double, often thrice as long as their bodies. The arms, where the animal is not diſturbed, and the ſeaſon not unfavourable, are thrown about in various directions, in order to ſeize and entangle its little prey; ſometimes three or four of the arms are thus employed, while the reſt are contracted like the horns of a ſnail, within the animal's body. It ſeems capable of giving what length it pleaſes to theſe arms; it contracts and extends them at pleaſure, and ſtretches them only in proportion to the remoteneſs of the object it would ſeize.

Theſe animals have a progreſſive motion, which is performed by that power they have of lengthening and contracting themſelves at pleaſure; they go from one part of the bottom to another; they mount along the margin of the water, and climb up the ſide of aquatic plants. They often are ſeen to come to the ſurface of the water, where they ſuſpend themſelves by the lower end. As they advance but very ſlowly, they employ a great deal of time in every action, and bind themſelves very ſtrongly to whatever body they chance to move upon as they proceed; their adheſion is voluntary, and is probably performed in the manner of a cupping-glaſs applied to the body.

All animals of this kind have a remarkable attachment to turn towards the light, and this naturally might induce an inquirer to look for their eyes; but however carefully this ſearch has been purſued, and however excellent the microſcope with which every part was examined, yet nothing of the appearance of this organ was found over the whole body; and it is moſt probable that, like ſeveral other inſects which hunt their prey by their feeling, theſe creatures are unfurniſhed with advantages which would be totally uſeleſs for their ſupport.

In the centre of the arms, as was ſaid before, the mouth is placed, which the animal can open and ſhut at pleaſure, and this ſerves at once as a paſſage for food, and an opening for it after digeſtion. The inward part of the animal's body ſeems to be one great ſtomach, which is open at both ends; but the purpoſes which the opening at the bottom ſerves are hitherto unknown, but certainly not for excluding their excrements, for thoſe are ejected at the aperture by which they are taken in. If the ſurface of the body of this little creature be examined with a microſcope, it will be found ſtudded with a number of warts, as alſo the arms, eſpecially when they are contracted; and theſe tubercles, as we ſhall preſently ſee, anſwer a very important purpoſe.

If we examine their way of living, we ſhall find theſe inſects chiefly ſubſiſting upon others, much leſs than themſelves, particularly a kind of millepedes that live in the water, and a very ſmall red worm, which they ſeize with great avidity. In ſhort, no inſect whatſoever, leſs than themſelves, ſeems to come amiſs to them; their arms, as was ſaid before, ſerve them as a net would a fiſherman, or perhaps more exactly ſpeaking, as a lime-twig does a fowler. Wherever their prey is perceived, which the animal effects by its feeling, it is ſufficient to touch the object it would ſeize upon, and it is faſtened without a power of eſcaping. The inſtant one of this inſect's long arms is laid upon a millepede, the little inſect ſticks without a poſſibility of retreating. The greater the diſtance at which it is touched, the greater is the eaſe with which the polypus brings the prey to its mouth. If the little object be near, though irretrievably caught, it is not without great difficulty that it can be brought up to the mouth and ſwallowed. When the polypus is unſupplied with prey, it teſtifies its hunger by opening its mouth; the aperture, however, is ſo ſmall that it cannot be eaſily perceived; but when, with any of its long arms, it has ſeized upon its prey, it then opens the mouth diſtinctly enough, and this opening is always in proportion to the ſize of the animal which it would ſwallow; the lips dilate inſenſibly by ſmall degrees, and adjuſt themſelves preciſely to the figure of their prey. Mr. Trembley, who took a pleaſure in feeding this uſeleſs brood, found that they could devour aliments of every kind, fiſh and fleſh, as well as inſects; but he owns they did not thrive ſo well upon beef and veal, as upon the little worms of their own providing. When he gave one of theſe famiſhed reptiles any ſubſtance which was improper to ſerve for aliment, at firſt it ſeized the prey with avidity, but after keeping it ſome time entangled near the mouth, it dropt it again with diſtinguiſhing nicety.

When ſeveral polypi happen to fall upon the ſame worm, they diſpute their common prey with each other. Two of them are often ſeen ſeizing the ſame worm at different ends, and dragging it at oppoſite directions with great force. It often happens, that while one is ſwallowing its reſpective end, the other is alſo employed in the ſame manner, and thus they continue ſwallowing each his part, until their mouths meet together; they then reſt, each for ſome time in this ſituation, till the worm breaks between them, and each goes off with his ſhare; but it often happens, that a ſeemingly more dangerous combat enſues, when the mouths of both are thus joined upon one common prey together: the largeſt polypus then gapes and ſwallows his antagoniſt; but what is very wonderful, the animal thus ſwallowed ſeems to be rather a gainer by the misfortune. After it has lain in the conqueror's body for about an hour, it iſſues unhurt, and often in poſſeſſion of the prey which had been the original cauſe of contention; how happy would it be for men, if they had as little to fear from each other!

Theſe reptiles continue eating the whole year, except when the cold approaches to congelation; and then, like moſt others of the inſect tribe, they feel the general torpor of nature, and all their faculties are for two or three months ſuſpended; but if they abſtain at one time, they are equally voracious at another, and, like ſnakes, ants, and other animals that are torpid in winter, the meal of one day ſuffices them for ſeveral months together. In general, however, they devour more largely in proportion to their ſize, and their growth is quick exactly as they are fed; ſuch as are the beſt ſupplied, ſooneſt acquire the largeſt ſize, but they diminiſh alſo in their growth with the ſame facility, if their food be taken away.

Such are the more obvious properties of theſe little animals, but the moſt wonderful ſtill remain behind: Their manner of propagation, or rather multiplication, has for ſome years been the aſtoniſhment of all the learned of Europe. They are produced in as great a variety of manners as every ſpecies of vegetable. Some polypi are propagated from eggs, as plants are from their ſeed; ſome are produced by buds iſſuing from their bodies, as plants are produced by inoculation, while all may be multiplied by cuttings, and this to a degree of minuteneſs that exceeds even philoſophical perſeverence.

With reſpect to ſuch of this kind as are hatched from the egg, little curious can be added, as it is a method of propagation ſo common to all the tribes of Inſect Nature; but with regard to ſuch as are produced like buds from their parent ſtem, or like cuttings from an original root, their hiſtory requires a more detailed explanation. If a polypus be carefully obſerved in ſummer, when theſe animals are chiefly active, and more particularly prepared for propagation, it will be found to burgeon forth from different parts of its body ſeveral tubercles or little knobs, which grow larger and larger every day; after two or three days' inſpection, what at firſt appeared but a ſmall excreſcence takes the figure of a ſmall animal, entirely reſembling its parent, furniſhed with feelers, a mouth, and all the apparatus for ſeizing and digeſting its prey. This little creature every day becomes larger, like the parent, to which it continues attached; it ſpreads its arms to ſeize upon whatever inſect is proper for aliment, and devours it for its own particular benefit; thus it is poſſeſſed of two ſources of nouriſhment, that which it receives from the parent by the tail, and that which it receives from its own induſtry by the mouth. The food which theſe animals receive often tinctures the whole body, and upon this occaſion the parent is often ſeen communicating a part of its own fluids to that of its progeny that grows upon it; while, on the contrary, it never receives any tincture from any ſubſtance that is caught and ſwallowed by its young. If the parent ſwallows a red worm, which gives a tincture to all its fluids, the young one partakes of the parental colour; but if the latter ſhould ſeize upon the ſame prey the parent polypus is no way benefited by the capture, but all the advantage remains with the young one.

But we are not to ſuppoſe that the parent is capable of producing only one at a time, ſeveral young ones are thus ſeen at once, of different ſizes, growing from its body, ſome juſt budding forth, others acquiring their perfect form, and others come to ſufficient maturity, and juſt ready to drop from the original ſtem to which they had been attached for ſeveral days. But what is more extraordinary ſtill, thoſe young ones themſelves that continue attached to their parent, are ſeen to burgeon, and propagate their own young ones alſo, each holding the ſame dependence upon its reſpective parent, and poſſeſſed of the ſame advantages that have been already deſcribed in the firſt connection. Thus we ſee a ſurpriſing chain of exiſtence continued, and numbers of animals naturally produced without any union of the ſexes, or other previous diſpoſition of nature.

This ſeems to be the moſt natural way by which theſe inſects are multiplied; their production from the egg being not ſo common; and though ſome of this kind are found with a little bladder attached to their bodies, which is ſuppoſed to be filled with eggs, which afterwards come to maturity, yet the artificial method of propagating theſe animals, is much more expeditious and equally certain: It is indifferent whether one of them be cut into ten, or ten hundred parts, each becomes as perfect an animal as that which was originally divided; but it muſt be obſerved, that the ſmaller the part which is ſeparated from the reſt, the longer it will be in coming to maturity, or in aſſuming its perfect form. It would be endleſs to recount the many experiments that have been tried upon this philoſophical prodigy; the animal has been twiſted and turned into all manner of ſhapes; it has been turned inſide out, it has been cut in every diviſion, yet ſtill it continued to move; its parts adapted themſelves again to each other, and in a ſhort time it became as voracious and induſtrious as before.

Beſides theſe kinds mentioned by Mr. Trembley, there are various others which have been lately diſcovered by the vigilance of ſucceeding obſervers, and ſome of theſe ſo ſtrongly reſemble a flowering vegetable in their forms, and they have been miſtaken by many naturaliſts for ſuch. Mr. Hughes, the author of the Natural Hiſtory of Barbadoes, has deſcribed a ſpecies of this animal, but has miſtaken its nature, and called it a ſenſitive flowering plant; he obſerved it to take refuge in the holes of rocks, and, when undiſturbed, to ſpread forth a number of ramifications, each terminated by a flowery petal which ſhrunk at the approach of the hand, and withdrew into the hole from whence before it had been ſeen to iſſue. This plant, however, was no other than an animal of the polypus kind, which is not only to be found in Barbadoes, but alſo an many parts of the coaſt of Cornwall, and along the ſhores of the continent.

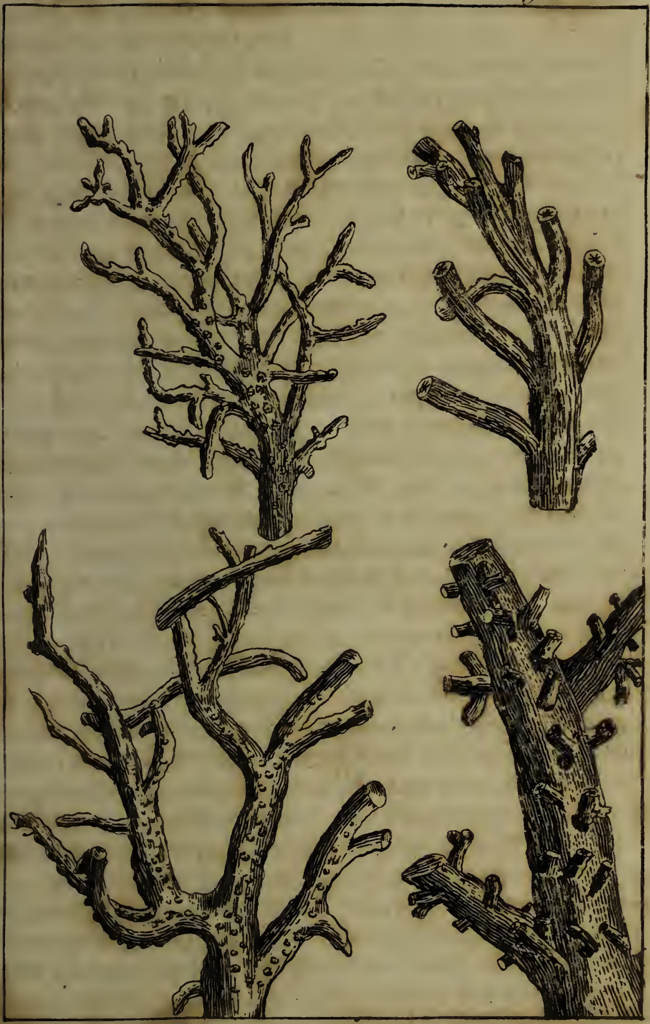
CHAP. V.

OF THE LYTHOPHYTES AND SPONGES.

IT is very probable that the animals we ſee and are acquainted with, bear no manner of proportion to thoſe that are concealed from us. Although every leaf and vegetable ſwarms with animals upon land, yet at ſea they are ſtill more abundant; for the greateſt part of what would ſeem vegetables growing there, are in fact nothing but the artificial formation of inſects, palaces which they have built for their own habitation.

If we examine the bottom of the ſea along ſome ſhores, and particularly at the mouths of ſeveral rivers, we ſhall find it has the appearance of a foreſt of trees under water, millions of plants growing in various directions, with their branches entangled in each other, and ſometimes ſtanding ſo thick as to obſtruct navigation. The ſhores of the Perſian Gulph, the whole extent of the Red-ſea, and the weſtern coaſts of America, are ſo choaked up in many places with theſe coraline ſubſtances, that though ſhips force a paſſage through them, boats and ſwimmers find it it impoſſible to make their way. Theſe aquatic groves are formed of different ſubſtances, and aſſume various appearances. The coral plants, as they are called, ſometimes ſhoot out like trees without leaves in winter; they often ſpread out a broad ſurface like a fan, and not uncommonly a large, bundling head like a faggot; ſometimes they are found to reſemble a plant with leaves and flowers; and often the antlers of a ſtag, with great exactneſs and regularity. In other parts of the ſea are ſeen ſponges of various magnitude, and extraordinary appearances, aſſuming a variety of phantaſtic forms like large muſhrooms, mitres, fonts, and flower-pots. To an attentive ſpectator theſe various productions ſeem entirely of the vegetable kind; they ſeem to have their leaves and their flowers, and have been experimentally known to ſhoot out branches in the compaſs of a year. Philoſophers, therefore, till of late, thought themſelves pretty ſecure in aſcribing theſe productions to the vegetable kingdom; and Count Marſigli, who has written very laboriouſly and learnedly upon the ſubject of corals and ſponges, has not heſitated to declare his opinion, that they were plants of the aquatic kind, furniſhed with flowers and ſeed, and endued with a vegetation entirely reſembling that which is found upon land. This opinion, however, ſome time after, began to be ſhaken by Rumphius and Juſſieu, and at laſt by the ingenious Mr. Ellis, who by a more ſagacious and diligent inquiry into Nature, put it paſt doubt that corals and ſponges were entirely the work of animals, and that like the honey-comb, which was formed by the bee, the coral was the work of an infinite number of reptiles of the polypus kind, whoſe united labours were thus capable of filling whole tracts of the ocean with thoſe embarraſſing tokens of their induſtry.

If in our reſearches after the nature of theſe plants, we ſhould be induced to break off a branch of the coraline ſubſtance, and obſerve it carefully, we ſhall perceive its whole ſurface, which is very rugged and irregular, covered with a mucous fluid, and almoſt in every part ſtudded with little jelly-like drops, which when cloſely examined, will be found to be no other than reptiles of the polypus kind. Thoſe have their motions, their arms, their appetites exactly reſem-



The CORAL PLANTS

bling thoſe deſcribed in the laſt chapter, but they ſoon expire when taken out of the ſea, and our curioſity is at once ſtopped in its career, by the animals ceaſing to give any mark of their induſtry; recourſe, therefore, has been had to other expedients, in order to determine the nature of the inhabitant as well as the habitation.

If a coraline plant be ſtrictly obſerved, while ſtill growing in the ſea, and the animals upon its ſurface be not diſturbed, either by the agitation of the waters, or the touch of the obſerver, the little polypi will then be ſeen in infinite numbers, each iſſuing from its cell, and in ſome kinds the head covered with a little ſhell, reſembling an umbrella, the arms ſpread abroad, in order to ſeize its prey, while the hinder part ſtill remains attached to its habitation, from whence it never wholly removes. By this time it is perceived that the number of inhabitants is infinitely greater than was at firſt ſuſpected; and that they are all aſſiduouſly employed in the ſame purſuits, and that they iſſue from their reſpective cells, and retire into them at pleaſure. Still, however, there are no proofs that thoſe large branches which they inhabit are entirely the conſtruction of ſuch feeble and minute animals. But chymiſtry will be found to lend a clue to extricate us from our doubts in this particular. Like the ſhells which are formed by ſnails, muſcles, and oyſters, theſe coraline ſubſtances efferveſce with acids, and may therefore well be ſuppoſed to partake of the ſame animal nature. But Mr. Ellis went ſtill farther, and examined their operations, juſt as they were beginning. Obſerving an oyſter-bed which had been for ſome time neglected, he there perceived the firſt rudiments of a coraline plantation, and tufts of various kinds ſhooting from different parts of this favourable ſoil. It was upon theſe he tried his principal experiment. He took out the oyſters which were thus furniſhed with coralines, and placed them in a large wooden veſſel, covering them with ſea-water. In about an hour, he perceived the animals, which before had been contracted by handling and had ſhewn no ſigns of life, expanding themſelves in every direction, and appearing employed in their own natural manner. Perceiving them, therefore, in this ſtate, his next aim was to preſerve them thus expanded, ſo as to be permanent objects of curioſity. For this purpoſe, he poured, by ſlow degrees, an equal quantity of boiling-water into the veſſel of ſea-water in which they were immerſed. He then ſeparated each polypus with pincers from its ſhell, and plunged each ſeparately into ſmall cryſtal vaſes, filled with ſpirit of wine mixed with water. By this means, the animal was preſerved entire, without having time to contract itſelf, and he thus perceived a variety of kinds, almoſt equal to that variety of productions which theſe little animals are ſeen to form. He has been thus able to perceive and deſcribe fifty different kinds, each of which is ſeen to poſſeſs its own peculiar mode of conſtruction, and to form a coraline that none of the reſt can imitate. It is true, indeed, that on every coraline ſubſtance there are a number of polypi found, no way reſembling thoſe which are the erectors of the building; theſe may be called a vagabond race of reptiles, that are only intruders upon the labours of others, and that take poſſeſſion of habitations, which they have neither art nor power to build for themſelves. But in general, the ſame difference that ſubſiſts between the honeycomb of the bee, and the paper-like cells of the waſp, ſubſiſts between the different habitations of the coral-making polypi.

With regard to the various forms of theſe ſubſtances, they have obtained different names from the nature of the animal that produced them, or the likeneſs they bear to ſome well-known object, ſuch as coralines, fungimadrepores, ſponges, aſtroites, and keratophytes. Though theſe differ extremely in their outward appearances, yet they are all formed in the ſame manner by reptiles of various kinds and nature. When examined chymically, they all diſcover the marks of animal formation; the corals, as was ſaid, diſſolve in acids, the ſponges burn with an odour ſtrongly reſembling that of burnt horn. We are left ſomewhat at a loſs with regard to the preciſe manner in which this multitude of cells, which at laſt aſſume the appearance of a plant or flower, are formed.

If we may be led in this ſubject by analogy, it is moſt probable, that the ſubſtance of coral is produced in the ſame manner that the ſhell of the ſnail grows round it; theſe little reptiles are each poſſeſſed of a ſlimy matter, which covers its body, and this hardening, as in the ſnail, becomes a habitation exactly fitted to the body of the animal that is to reſide in it; ſeveral of theſe habitations being joined together, form at length a conſiderable maſs, and as moſt animals are productive in proportion to their minuteneſs, ſo theſe multiplying in a ſurpriſing degree, at length form thoſe extenſive foreſts that cover the bottom of the deep.

Thus all Nature ſeems replete with life; almoſt every plant on land has its ſurface covered with millions of theſe minute creatures, of whoſe exiſtence we are certain, but of whoſe uſes we are entirely ignorant; while numbers of what ſeem plants at ſea are not only the receptacles of inſects, but alſo entirely of inſect formation. This might have led ſome late philoſophers into an opinion, that all Nature was animated, that every, even the moſt inert maſs of matter, was endued with life and ſenſation, but wanted organs to make thoſe ſenſations perceptible to the obſerver: thoſe opinions, taken up at random, are difficultly maintained, and as difficultly refuted; like combatants that meet in the dark, each party may deal a thouſand blows without ever reaching the adverſary. Thoſe, perhaps, are wiſer who view Nature as ſhe offers; who without ſearching too deeply into the receſſes in which ſhe ultimately, hides are contented to take her as ſhe preſents herſelf, and ſtoring their minds with effects rather than with cauſes, inſtead of the embarraſſments of ſyſtems, about which few agree, are contented with the hiſtory of appearances, concerning which, all mankind have but one opinion.

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Air, the only active agent in earthquakes, i. 65; Amonton's calculation of a moderate degree of heat ſufficient to give the air amazing powers of expanſion, 66; too fine for our ſight, is very obvious to our touch; its claſticity; a cubic foot of air weighs more than an ounce, 173, 174; a hand upon the mouth of a veſſel from which the air has been exhauſted, is violently ſucked inwards, and why, 174; the mouth of ſuch veſſel inverted being immerſed, the water will riſe into the empty ſpace, and fill the glaſs; the manner in which this is done; water never aſcends higher than thirty-two feet; our ordinary load of air amounts nearly to forty thouſand pounds, 175; four thouſand pounds weight of air carried at one time more than at another, and why; the air contained in a nut-ſhell, may be dilated into unknown dimenſions; the air contained in a houſe, may be compreſſed into a cavity equal to the eye of a needle; the encreaſing elaſticity of compreſſed air augmented by heat, would when expanded be ſufficient for the exploſion of a world, 176; one of the moſt compounded bodies in nature, 180; ſcarce any ſubſtance reſiſting its corroding qualities, 181; factitious air produced in great quantities from vegetable, animal, or mineral ſubſtances; proves a greater enemy to animals than a vacuum; a bird encloſed in artificial air, from raiſins, died in a quarter of a minute; a frog included in artificial air; a ſnail put into the receiver, with air of paſte, died in four minutes, 184; to be wholeſome, ſhould not be of one kind, but a compound of ſeveral ſubſtances, 185; how air contributes to the ſupport of our lives; diſpute upon it, 191, 192; gives life and body to flame, 192; kindles fire into flame, moderates the rays of light, and diſſipates their violence; conveyance of ſound; all the pleaſure received from converſation or from muſic, depends entirely upon the air; odours are diffuſed by the air, 193; vegetables, or the bodies of animals left to putrefy, produce air in a very copious manner; it finds admiſſion into wine or other fermented liquors, and moſt eaſily into ſpirits of wine; mountains, minerals, vegetables, animals, and fires, contribute to increaſe a current of air, 195; a tide of air produced by the ſun and moon; a current of air, driven through a contracted ſpace, grows more violent and irreſiſtible, 204.

Air-bladder, in fiſhes, deſcribed, iii. 329.

Air-pump. See *Carp*, iii. 329, 332. See *Fiſhes*, iii. 331, &c.

Albatroſs, a bird of the gull kind; its deſcription by Edwards; is an inhabitant of the tropical climates, and other regions, as far as the ſtraits of Magellan in the South Seas; is the moſt fierce and formidable of the aquatic tribe; it chiefly purſues the flying-fiſh, forced from the ſea by the dolphins; Wiquefort's account of this bird; it ſeems to have a peculiar affection for the penguin, and a pleaſure in its ſociety; its neſt, iii. 272 to 274.

Albouras, a famous volcano near Mount Taurus, i. 62.

Alder, hares will not feed on the bark of it, ii. 257.

Algazel, the ſeventh variety of gazelles with Mr. Buffon, ii. 77.

Aldrovandus, places the bats among birds, ii. 326; he having ſpent a fortune to enlighten mankind, and collected more truth and falſehood than any man, was reduced to want, to ſuffer ingratitude, and to die in an hoſpital, iii. 302.

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Alligator, or the *Cayman*, a kind of crocodile, iv. 96.

Alps, dreadful chaſms found in them, i. 40; Pope's deſcription of a traveller ſtraining up the Alps, 86; the higheſt point of them not above fixteen hundred toiſes above the ſurface of the ſea, 92.

Amazons, the greateſt river in the world, has its ſource among the Andes, i. 86; its courſe from its origin in the lake of Lauricocha, to its diſcharge in the Weſtern Ocean, is more than twelve hundred leagues, its diſcharge is through a channel of a hundred and fifty miles broad, after receiving above ſixty conſiderable rivers, 128.

Ambergris, long conſidered as a ſubſtance found floating on the ſea, but ſince diſcovered to belong to the cachalot; the balls of ambergris found in all fiſhes of this kind, but chiefly in the oldeſt and ſtrongeſt, iii. 355.

Ambroſe, (St.) his credulity concerning the halcyon, iii. 315.

America, exceeds in the ſize of its reptiles, but is inferior in its quadrupeds, i. 410; that part of the American continent which lies under the line, is cool and pleaſant, 357; the cauſe of the tawney colour of the North American Indians; they paint their ſkins with red ochre, and anoint them with the fat of bears, 359; the original cauſe of their flat heads, 360; American wood-duck deſcribed, iii. 308. See *Tapir*, i. 410. See *Quadrupeds*, i. 411. See *Dog*, ii. 187. See *Rats*, ii. 292. See *Rabbits* (Syrian), ii. 266. See *Bats*, ii. 332. See *Savages*, ii. 378. See *Pacos*, iii. 13. See *Mock-bird*, iii. 202.

Amia, or *Bonito*, deſcription of this fiſh, iii. 404.

Ammodytes, or the *Lance*, a fiſh; its deſcription, iii. 402.

Ammodytes, a kind of viper; it darts with amazing ſwiftneſs, iv. 129.

Amonton. See *Air*, i. 66.

Amour, a river of Eaſtern Tartary, i. 124; it receives about forty leſſer rivers, 128.

Amphiſbœna, or the double-headed ſerpent, iv. 151.

Anarchicas, the wolf-fiſh, its deſcription, iii. 402.

Anatomiſts. See *Apes*, i. 399. See *Lamprey*, iii. 381.

Anchovy, has no bladder, iii. 331.

Andaluſia, gennets of that province the beſt, ii. 14.

Andes, amazing chaſms or fiſſures in them; ſome of theſe are a mile wide, and others, running under ground, reſemble a province, i. 41; the higheſt mountains of the world, 62; excellent deſcription of them by Ulloa; the Andes are by meaſure three thouſand one hundred and thirty-ſix toiſes, or fathoms, above the ſurface of the ſea, 91; at the top no difficulty of breathing perceived, 92; manner of mules going down the precipices, ii. 30.

Anemometer, an inſtrument to meaſure the velocity of the wind; gives no certain information of the force of a ſtorm., i. 205.

Angora, the cat of Angora, ii. 152, 153; the goat of Angora; a number of animals about Angora, affording hair for trade; the camblet made of ſuch hair, 68.

Anhima, a bird of the crane kind, of Braſil, iii. 235; deſcribed; the cock and the hen prowl together; when one dies, the other ſtays by it, and dies alſo, 236.

Animals, hold the firſt rank amidſt the infinitely different productions the earth offers; are endowed with powers of motion and defence, even thoſe fixed to one ſpot; organized beings provided with ſome defence for their own ſecurity; endued with life and vigour; ſome, by nature, violent; have their enmities and affections; ultimately ſupported upon vegetables; thoſe in a dry ſunny climate ſtrong and vigorous; different vegetables appropriated to the different appetites; and why; of domeſtic kinds, carried from milder countries into the northern climates, quickly degenerate and grow leſs; in the internal parts of South America and Africa grow to a prodigious ſize, and why; not ſo in the cold frozen regions of the North; the moſt perfect races have the leaſt ſimilitude to the vegetable productions on which they are ultimately fed; the meaner the animal, the more local; aſſume different habits as well as appearances, and why; ſome peculiar to every part of the vegetable ſyſtem; there are that live upon other animals; this wiſely ſo conſtituted; to diminiſh the number of animals, and increaſe that of vegetables, the general ſcope of human induſtry; of the vaſt variety, very few ſerviceable to man; in a catalogue of more than twenty thouſand land animals, ſcarcely a hundred are any way uſeful to man; expediency of man's living upon animals as well as vegetables; little more known than that the greateſt number require the concurrence of a male and female to reproduce their kind; and theſe, diſtinctly and invariably, found to beget creatures of their own ſpecies, i. 231 to 239; uſual diſtinction, with reſpect to their manner of generation, into oviparous and viviparous kinds, 242; the warmth of the ſun, or of a ſtove, efficacious in bringing the animal in the egg to perfection, 245; ſuch parts as the animal has double, or without which it can live, are the lateſt in production, 249; De Graaf has attended the progreſs and encreaſe of various animals in the womb, and minutely marked the changes they undergo, 250; that which, in proportion to its bulk, takes the longeſt time for production, the moſt complete when finiſhed; of all others, man the ſloweſt in coming into life;

the moſt formidable are the leaſt fruitful; and why; thoſe which bring forth many engender before they have arrived at half their natural ſize; approach more to perfection, whoſe generation nearly reſembles that of man, 256 to 258; men and apes the only that have eye-laſhes upon the upper and lower lids, all others want them on the lower lid, 276; that which has moſt deſires appears capable of the greateſt variety of happineſs, 297; thoſe of the foreſt remain without food ſeveral weeks; all endure the want of ſleep and hunger with leſs injury to health than man; nature contracts the ſtomachs of carnivorous animals of the foreſt to ſuit them to their precarious way of living; but the meaner tribes are ſtill more capable of ſuſtaining life without food, 298; ſome lower animals ſeem to ſpend the greateſt part of their lives in ſleep, 303; ſome affected by muſic; inſtances of it, 305; thoſe furniſhed with hands have more underſtanding than others, 331; in general, the large animals live longer than the little, 339; 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the inteſtines of carnivorous animals are thin and lean; but thoſe of the ruminating ſort ſtrong, fleſhy, and well covered with fat; of all others, man ſpends the leaſt time in eating; of all ruminant animals the cow-kind deſerve the firſt rank, ii. 37 to 40; naturaliſts give various names to the ſame, only differing in accidental circumſtances; of all, except man, the cow moſt extenſively propagated; greateſt variety among cows, none more humble and pliant of diſpoſition; the large kind of the torrid zone very fond of the water ; ſome void their dung, when purſued; this ariſes rather from fear, than a deſire of defence ; the number of the cow kind, by naturaliſts extended to eight or ten ſorts, reduced to two ; one animal of the cow kind, no naturaliſt has hitherto deſcribed, it may be added as a third ſpecies ; deſcription of it ; all the ruminant internally much alike ; thoſe that take refuge under the protection of man, in a few generations become indolent and helpleſs ; the ſheep, in a domeſtic ſtate, the moſt defenceleſs and inoffenſive ; 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ſome live without brain for many weeks together; ſome increaſe and grow large, though all their nobler organs are entirely deſtroyed; ſome continue to exiſt though cut in two, their nobler parts preſerving life, while the others periſh that were cut away; the zoophyte tribe, continues to live in ſeparate parts, and one animal by the means of cutting, is divided into two diſtinct exiſtencies, ſometimes into a thouſand, 312; the firſt diſcovery of the power of reproduction in animals owing to Mr. Trembley, 313.

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Antiquity, moſt naturally looked up to with reverential wonder, i. 373.

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Ariſtotle's opinion about the formation of the incipient animal, i. 239; and mules being ſometimes prolific, ii. 24.

Arlotto, an Italian Franciſcan friar; for his ſleeping tranſgreſſions taken before the Inquiſition, and like to be condemned for them, i. 307, 308.

Armadilla, or *Tatou*, generally referred to the tribe of inſects or ſnails, i. 400; an inhabitant of South America; a harmleſs creature, furniſhed with a peculiar covering for its defence; attacked without danger, and liable to perſecutions; is of different ſizes, in all, however, the animal is partially covered with a coat of mail, a ſtriking curioſity in natural hiſtory; has the ſame method of protecting itſelf as the hedgehog or pangolin; when attacked, rolls itſelf up in its ſhells, like a ball, and continues ſo till the danger is over; the Indians take it in this form, lay it cloſe to the fire, and oblige it to unfold; this animal utterly unknown before the diſcovery of America; does miſchief in gardens; bears the cold of our climate without inconvenience; the mole does not burrow ſwifter than the armadilla; burrows deep in the earth; expedients uſed to force them out; manner of taking them alive; ſometimes in ſnares by the ſides of rivers, and low, moiſt places which they frequent; never found at a diſtance from their retreats; eſcapes by rolling itſelf up, and tumbling down from rock to rock, without danger or inconvenience; its food; ſcarce any that do not root the ground like a hog; a kind of friendſhip between them and the rattleſnake, they are frequently found in the ſame hole; they all reſemble each other, as clothed with a ſhell, yet differ in ſize, and in the diviſion of their ſhell; the various kinds; the pig-headed ſort, the weaſel-headed, the kabaſſou, and the encoubert are the largeſt, ii. 321, to 325.

Arno, the river, a conſiderable piece of ground gained at the mouth of it, i. 160.

Aro, numbers of birds of paradiſe ſeen there, iii. 169.

Arſe-feet, name our ſailors give to birds of the penguin tribe, i. 288.

Arſenius, tutor to the emperor Arcadius, lived a hundred and twenty years, i. 302.

Arts, faults that has infected moſt of our dictionaries and compilations of natural hiſtory, i. 397; teaching the arts of cruelty equivalent to committing them, iii. 121.

Aſia, aim of the Aſiatics to poſſeſs many women, and to furniſh a ſeraglio their only ambition, i. 269; luſtre of jewels and ſplendour of brilliant colours eagerly ſought after by all conditions of men, 283.

Aſia Minor, deſcription of its inhabitants, i. 355, 356.

Aſiatic, the olive-coloured, claims the hereditary reſemblance to our common parent; an argument to prove the contrary, i. 360, 361.

Aſp, a kind of ſerpent, iv. 147.

Aſphaltum, an injection of petreoleum and an application of aſphaltum ſuffice to make a mummy, i. 386.

Aſs and horſe, though nearly alike in form, are diſtinct kinds, different in natures; with only one of each kind, both races would be extinguiſhed; in the ſtate of nature entirely different, wild aſs in greater abundance than the wild horſe; wild aſs and the zebra a different ſpecies; countries where the wild aſs is found; ſome run ſo ſwift, few courſers can overtake them; caught with traps; taken chiefly for the fleſh and ſkins, which make that leather called ſhagreen; entertainment of wild aſſes in Perſia ſeen by Olearius; the delicacy of its fleſh a proverb there; Galen deems it unwholeſome; aſſes originally imported into America by the Spaniards, have run wild, and multiplied in ſuch numbers as to be a nuiſance; chaſe of them in the kingdom of Quito; have all the ſwiftneſs of horſes; declivities and precipices do not retard their career; after the firſt load their celerity leaves them, their dangerous ferocity loſt, and they contract the ſtupid look and dulneſs peculiar to the aſinine ſpecies; will not permit a horſe to live among them; always feed together; and a horſe ſtraying where they graze, they fall upon, bite, and kick him till he be dead; their preference to any vegetable is to the plantane; they drink as ſoberly as they eat, and never dip the noſe into the ſtream; fear to wet their feet, and turn out to avoid the dirty parts of a road; ſhew no ardour but for the female, and often die after covering; ſcent an owner at a diſtance, and diſtinguiſh him in a crowd; with eyes covered, they will not ſtir a ſtep; when laid down, one eye covered with the graſs, and the other hidden with a ſtone or other contiguous body, they will not ſtir, or attempt to riſe, to get free from impediments; ſeveral brought up to perform, and exhibited at a ſhow; ſuffered to dwindle every generation, and particularly in England; bulk for bulk, an aſs ſtronger than a horſe, and ſurer-footed; alſo leſs apt to ſtart than the horſe; more healthy than the horſe; Perſians cleave their noſtrils to give them more room for breathing; Spaniards alone know the value of the aſs; the Spaniſh jack-aſs above fifteen hands high; the aſs originally a native of Arabia; warm climates produce the largeſt and the beſt; entirely loſt among us during the reign of queen Elizabeth; Holingſhed pretends our land yields no aſſes, yet they were common in England before that time; in Sweden they are a ſort of rarity; by the laſt hiſtory of Norway, they had not reached that country; in Guinea, they are larger and more beautiful than the horſes of that country; in Perſia, are two kinds, ſome ſold for forty or fifty pounds; no animal covered with hair leſs ſubject to vermin; lives till twenty or twenty-five; ſleeps leſs than the horſe, and never lies down for it, unleſs much tired; ſhe-aſs croſſes fire and water to protect her young; the gimerro bred between the aſs and the bull; the ſize and ſtrength of our aſſes improved by importation of Spaniſh jack-aſſes, 23 to 30; deſtroyed by the South-American bat, called vampyre, ii. 332.

Aſſafœtida, ſavage nations delighted with the ſmell, i. 329.

Aſſiniboils, lake, where the river St. Lawrence takes its riſe, i. 127.

Aſtroites among coral ſubſtances, iv. 326.

Atalantis, an iſland ſubmerſed, was as large as Aſia Minor and Syria; the fruits of the earth offered without cultivation, i. 81, 82.

Athanatus, inſtance of his ſtrength, i. 294.

Athelſtan, prohibited the exportation of mares and ſtallions, except as preſents, ii. 20.

Athenians had their cock-matches, iii. 120. See *Quail-fighting*, iii. 146.

Atherine, deſcription of this fiſh, iii. 403.

Atmoſphere, moſt diſorders incident to mankind, ſays Bacon, ariſe from changes in the atmoſphere, iii. 331.

Attraction, defined; the ſun poſſeſſed of the greateſt ſhare, i. 10.

Avoſetta, or ſcooper, a bird found in Italy; now and then comes over into England; its deſcription, and extraordinary ſhape of its bill, iii. 252.

Aurelia, one of the appearances of the caterpillar, iv. 228, 234; laying it in a warm room, Mr. Reaumur haſtened the diſcloſure of the butterfly, and by keeping it in an ice-houſe, retarded it; though it bears a different appearance, it contains all the parts of the butterfly in perfect formation; ſome inſects continue under that form not above ten days, ſome twenty, ſome ſeveral months, others for a year together, 238; how the butterfly gets rid of that covering, 239; aurelia of the bee different from that of the common caterpillar, 266.

Aurora Borealis, or northern light, ſtreams with peculiar luſtre, and a variety of colours round the pole; its appearance almoſt conſtant in winter; and when the ſun departs for half a year, this meteor ſupplies its beams, affording light for all the purpoſes of exiſtence, i. 222.

Aurora, or the ſamiri, the ſmalleſt and moſt beautiful of the ſapajou monkeys; its deſcription; is very tender, delicate, and held in high price, ii. 381.

Auvergne, in France, an amazing mummy dug up at that place, i. 384.

Auk, a bird bred in the iſland of St. Kilda, iii. 292.

Axis, a kind of beautiful ſtag; its deſcription, ii. 103.

Azores, ſerpents, adders, and ſnakes ſeen about theſe iſlands by Sir Robert Hawkins in 1590, i. 140.

B.

Baboon, ſurvey of the baboon kind, ii. 355; fierce, malicious, ignorant, and untractable; its deſcription; impelled by a hatred for the males of the human ſpecies, and a deſire for women; the Chevalier Forbin relates, that in Siam, whole troops will ſally forth, plunder the houſes of proviſions, and endeavour to force the women; manner of robbing an orchard or vineyard at the Cape of Good Hope; the female brings forth one at a time, carries it in her arms, clinging to her breaſt; at the Cape of Good Hope, the young of theſe animals are taught to guard houſes, and perform the duty with punctuality; they ſeem inſenſible of the miſchief they do; a baboon deſcribed by Mr. Buffon; laſciviouſneſs predominant; their food; are not found to breed in our climate; are not carnivorous; their liver, like that of a dog, divided into ſix lobes; the largeſt of the kind is the mandril; its deſcription; diſpleaſed, it weeps like a child; is a native of the Gold Coaſt; that called Wanderow chiefly ſeen in the woods of Ceylon and Malabar; its deſcription; the Maimon of Buffon, by Edwards called the pig-tail, the laſt of the ſort; its deſcription; a native of Sumatra, ii. 366, 370.

Baby, the name of a dwarf, whoſe complete hiſtory is very accurately related by Mr. Daubenton, i. 368.

Babyroueſſa, the Indian hog, its deſcription; travellers call it the hog of Borneo; in what manner it eſcapes the purſuers; has enormous tuſks of fine ivory; leſs dangerous than the wild boar; the tuſks have points directed to the eyes, and ſometimes grow into them; theſe animals, in a body, are ſeen with the wild boars, with which they are not known to engender; are eaſily tamed; have a way of repoſing different from other animals of the larger kind, by hitching one of their upper tuſks on the branch of a tree, and ſuffering their whole body to ſwing down at eaſe; they are fierce and terrible when offended, and peaceable and harmleſs when unmoleſted; their fleſh good to be eaten, but ſaid to putrefy in a ſhort time; they chiefly live upon vegetables and the leaves of trees; are found in the iſland of Borneo, and in other parts of Aſia and Africa, ii. 142 to 144.

Bacon's obſervations upon fiſhes, iii. 331.

Badger, a ſolitary ſtupid animal; forms a winding hole, and remains in ſafety at the bottom; the fox takes poſſeſſion of the hole quitted by the badger, or forces it from the retreat by wiles; ſurpriſed by the dogs at a diſtance from its hole, it fights with deſperate reſolution; all that has life is its food; it ſleeps the greateſt part of its time, and though not voracious, keeps fat, particularly in winter; it keeps the hole very clear; the female makes a bed of hay for her young; brings forth, in ſummer, three or four young; how ſhe feeds them;

the young are eaſily tamed; the old are ſavage and incorrigible; are fond of fire, and often burn themſelves dangerouſly; are ſubject to the mange, and have a gland under the tail, which ſcents ſtrongly; its fleſh rank and ill taſted, iii. 18, 19.

Bag, name of the falſe belly of the oppoſſum; its deſcription, ii. 384, 385.

Bag, or pouch of the civet. See *Civet*, ii. 246.

Bait, the beſt for all kinds of fiſh is freſh herring; the larger ſort will take a living ſmall fiſh upon the hook ſooner than any other bait, iii. 374.

Balance, to determine the ſpecific gravity of metals, i. 112.

Balearic crane, its deſcription; the real crane of Pliny; comes from the coaſt of Africa and Cape de Verd iſlands; has been deſcribed by the name of ſea-peacock; foreign birds of the crane kind deſcribed, the jabiru; the jubiru-guacu, the anhima, and the buffoon bird, iii. 233 to 236.

Ball of fire of the bigneſs of a bomb; its effects, i. 218.

Baltic, the Danes in poſſeſſion of it, i. 136.

Banks, of a river, after inundations, appear above water, when all the adjacent valley is overflown, and why, i. 119.

Banana, the elephant eats the plant to the roots, ii. 393.

Barb, an Arabian horſe bred in Barbary, ii. 13.

Barbs, of the whale, or whale-bone, iii. 42.

Barbary hen, its deſcription, iii. 135.

Barble, a flat fiſh, its growth, iii. 417.

Barja, in South America, cattle deſtroyed at that place by the American bats, called vampyres, ii. 332.

Baris. See *Apes*, ii. 360.

Barnacle, imaginary, a ſhell-fiſh, iv. 67.

Barometer, ſerviceable in meaſuring the height of mountains, i. 92; meaſures the weight of the air; in what manner, 176; no changes in the air without ſenſible alteration in the barometer, 177; when it marks a peculiar lightneſs in the air, no wonder that it foretells a ſtorm, and why, 203.

Barretiere, a famous youth, conſidered as a prodigy of learning at the age of fourteen; ſlept regularly twelve hours in the twenty-four, i. 305.

Baſs, a rocky iſland in the Firth of Forth. See *Birds*, iii. 278.

Bath, perſons coming out of a warm bath ſeveral ounces heavier than they went in; warm bath of ſea-water a kind of relief to mariners, upon a failure of freſh-water at ſea, i. 139.

Bat, bats as big as rabbits, i. 234; by ſome reckoned among birds, 400; doubtful among naturaliſts whether beaſt or bird; now univerſally take place among quadrupeds, ii. 326; Pliny, Geſner, and Aldrovandus placed it among birds; ſcarce in any particular reſembles the bird, except in the power of ſuſtaining itſelf in the air; deſcription of the common ſort in England; its inteſtines and ſkeleton, in ſome meaſure, reſemble thoſe of mankind; makes its firſt appearance early in ſummer, and begins its flight in the evening; is ſeen to ſkim along the ſurface of waters; feeds upon gnats, moths, and nocturnal inſects of every kind, which it purſues open-mouthed; its flight laborious, irregular, and, if interrupted, not readily followed by a ſecond elevation; uſually taken when, ſtriking againſt an object, it falls to the ground; even in the ſummer, it ſleeps the greateſt part of the time; its retreat; continues in a torpid ſtate during winter; is uſually hanging by its hooked claws to the roofs of caves, unaffected by all change of weather; is deſtroyed particularly by the owl; the bat couples and brings forth in ſummer from two to five young at a time; the female has two nipples forward on the breaſt, as in the human kind, and this a motive for Linnæus to give it the title of a primas, to rank it in the ſame order with mankind; the female makes no neſt for her young; when ſhe begins to grow hungry, and finds a neceſſity of ſtirring abroad, ſhe takes her little ones and ſticks them by their hooks againſt the ſides of her apartment, and there they immoveably cling and patiently wait her return; leſs ſimilitude to the race of birds than of quadrupeds; great labour in flying ſoon fatigues and tires it in leſs than a hour; its petty thefts upon the fat of bacon; long-eared bat; horſe-ſhoe bat; rhinoceros bat; a large race of bats in the Eaſt and Weſt Indies truly formidable; a dangerous enemy; when united in flocks they become dreadful; they are ate; the Negroes of the African coaſt will not eat them though ſtarving; on the African coaſt they fly in ſuch numbers, as to obſcure the ſetting ſun; the rouſette, or great bat of Madagaſcar is found along the coaſts of Africa and Malabar, where it is often ſeen about the ſize of a large hen; deſtroys the ripe fruits, and ſometimes ſettles upon animals, and man himſelf; deſtroy fowls and domeſtic animals, unleſs preſerved with the utmoſt care, and often faſten upon the inhabitants, attack them in the face, and make terrible wounds; the ancients have taken their idea of harpies from theſe fierce and voracious creatures, equally deformed, greedy, uncleanly and cruel; the bat called the American vampyre; its deſcription by Ulloa; purport of his account confirmed by various travellers, who all agree that it has a faculty of drawing blood from perſons ſleeping, and deſtroying them before they awake; a ſtrong difficulty remains how they make the wound; Ulloa and Buffon's opinions; ſuppoſe the animal endowed with a ſtrong power of ſuction; and that, without inflicting any wound, by continuing to draw, it enlarges the pores of the ſkin, ſo that the blood at length paſſes; they are one of the great peſts of South America, ii. 326, to 332; found in the holes deſerted by the woodpecker, iii. 165.

To bay, ſaid of a ſtag when he turns his head againſt the hounds, ii. 98.

Beagle. See *Hound*, ii. 191.

Beak, how that of animals is produced, i. 285.

Beam, by hunters meant that part which bears the antlers, ii. 98.

Beams, thoſe of the ſun ſhining upon the fire put it out, and why; darting directly upon us, without the medium of the air, would burn us up at once, or blind us with effulgence, i. 193.

Bears, in cold, frozen regions of the North, not ſmaller than in milder countries i. 234; the North American Indians anoint their ſkins with fat of bears, 359; the bears now and then make depredations upon the rein-deer, ii. 128; in Greenland do not change colour, 230; three different kinds; the black of America does not reject animal-food, as believed; places where they are found; retreat of the brown bear; a vulgar error, that, during winter, the brown bear lives by ſucking its paws; it ſeems rather to exiſt upon the exuberance of its former fleſh, iii. 15; the male and female do not inhabit the ſame den, and ſeldom are ſeen together, but upon the acceſſes of genial deſire; care of the female for her young; the bear, when tamed, ſeems gentle and placid, yet ſtill to be diſtruſted and managed with caution, being often treacherous and reſentful without a cauſe; is capable of a degree of inſtruction; when come to maturity, can never be tamed; methods of taking them; their paws and hams a great delicacy; the white placed in the coldeſt climates, grows larger than in the temperate zones, and remains maſter of the icy mountains in Spitzbergen and Greenland; unable to retreat when attacked with fire-arms, they make a fierce and long reſiſtance; they live upon fiſh and ſeals, their fleſh is too ſtrong for food; are often ſeen on ice-floats, ſeveral leagues at ſea, though bad ſwimmers; the white ſometimes jumps into a Greenlander's boat, and if he does not overſet it, ſits down calmly, and like a paſſenger ſuffers itſelf to be rowed along; hunger makes it ſwim after fiſh; often a battle enſues between a bear and a morſe, or a whale, and the latter generally proves victorious, 16 to 18.

Beards, Americans taking great pains to pluck theirs up by the roots, the under part, and all but the whiſkers, therefore ſuppoſed to have no hair growing on that part; Linnæus himſelf has fallen into this miſtake; different cuſtoms of men, in the manner of wearing their beards, i. 283, 284.

Beaſts are more fierce and cruel in all countries where men are moſt barbarous, i. 410.

Beaſts of chaſe, in the reign of William Rufus, and Henry the Firſt, it was leſs criminal to deſtroy one of the human ſpecies than a beaſt of chaſe; ſacred edifices thrown down, and turned to waſte, to make room for beaſts of chaſe, ii. 96.

Beaſt, of prey, ſeldom devour each other; they chiefly ſeek after the deer or the goat; their uſual method of hunting, i. 405.

Beaver, known to build like an architect, and rule like a citizen, i. 408; its fore parts taſte like fleſh, and the hinder like the fiſh it feeds on, ii. 142; a remaining monument of brutal ſociety; its qualities, taken from its fellows, and kept in ſolitude or domeſtic tameneſs; reſiſts only when driven to extremity, and fights when its ſpeed cannot avail; the only quadruped that has a flat broad tail, covered with ſcales, ſerving as a rudder to direct its motions in the water, the ſole quadruped with membranes between the toes on the hind feet, and none on the fore feet; the only animal in its fore parts entirely reſembling a quadruped, and in its hinder parts approaches the nature of fiſhes, having a ſcaly tail; its deſcription; has but one vent for the emiſſion of excrements and urine, they aſſemble about the months of June and July, make a ſociety to continue the greateſt part of the year; form a company of above two hundred; fix their abode by the ſide of a lake or river; cut with their teeth a tree thicker than a man's body; amazing works and manſion houſes; convey their materials by water; mix clay and dry graſs together, work it into a mortar, and with their tails plaiſter their work within and without, their walls perpendicular, and two feet thick; their piers fourſcore or a hundred feet long, and ten or twelve feet thick at the baſe; their dikes ten and twelve feet thick at the foundation; their apartments round, or oval, and divided into three ſtories, one above the other; viſited too often by men, they work only the night time, or abandon the place, and ſeek a ſafer ſituation; four hundred reſide in one manſion houſe, divided into a number of apartments, having communication with each other; their works in the northern parts finiſhed in Auguſt or September; in ſummer they are epicures; their proviſions for the winter ſeaſon; they drive piles into the earth, to fence and fortify their habitation againſt the wind and water; cut down branches three to ten feet in length; the largeſt are conveyed to their magazines by a whole body; the ſmalleſt by one only; each taking a different way, and having a walk aſſigned him, that no one ſhould interrupt another in his work; wood yards larger or ſmaller, in proportion to the number in family, manner of catching them in ſnares or by ſurpriſe; they ſwim with their mortar on their tails, and their ſtakes between their teeth; their works damaged by force of water, or feet of huntſmen, inſtantly repaired, ii. 338 to 543.

Beauty, every country has peculiar ideas of beauty; extraordinary taſtes for beauty, i. 271; every nation, how barbarous ſoever, has peculiar arts of heightening beauty; ſeveral of theſe arts, 272; a modern lady's face formed exactly like the Venus of Medicis, or the ſleeping Veſtal, would ſcarcely be conſidered as a beauty, except by the lovers of antiquity; leſs in the object than in the eye of the beholder; ſuperior beauty of our anceſtors not eaſily comparable, i. 374.

Beccafigo, a bird of the ſparrow kind, iii. 196.

Bed, of a river, an increaſe of water there increaſes its rapidity, except in caſes of inundation. and why; ſuch bed left dry for ſome hours by a violent ſtorm blowing directly againſt the ſtream, i. 122.

Beds, the earth every where in beds over beds, and each of them maintaining exactly the ſame thickneſs, i. 40.

Bee, a ruminating inſect, or ſeemingly ſo; its ſtomach is compoſed of muſcular fibres, ii. 39; operations ſtudied for two thouſand years are ſtill incompletely known; Reamur's account ſufficiently wonderful; many of the facts held dubious by thoſe converſant with the ſubject; ſome declared not to have exiſtence in nature; three different kinds of bees; common working bees neither male nor female; queen bees lay all the eggs that are hatched in a ſeaſon; ſtructure of the working bee, particularly of its trunk, which extracts the honey from flowers; manner of building their cells; in one day, they make cells upon each other enough to contain three thouſand bees; deſcription of thoſe cells; the combs made by inſenſible degrees, not at once as ſome imagine; the cells for the young and for the drones; that for the queen bee the largeſt of all; thoſe for honey are deeper than the reſt; that not the only food upon which they ſubſiſt; manner of anticipating the progreſs of vegetation; the bee has a ſtomach for wax as well as honey; bee-bread; treacle for food of bees in winter; what part of the flower has the honey; ſting of the bee; any wanting food, bends down its trunk to the bee from whom it is expected, which, then opens its honey-bag, and lets ſome drops fall into the other's mouth; numerous as the multitude of bees appear in a ſwarm, they all owe their origin to one parent, called the queen bee; opening the body of a queen, the eggs at one time found to amount to five thouſand; the queen eaſily diſtinguiſhed from the reſt; great fertility of the queen, and the great attentions paid to her, controverted by recent obſervers; they leave a cell to every egg and deſtroy the reſt; great care and affection for the young; in about twenty days after the egg was laid, the bee was completely formed, and fitted to undergo the fatigues of its ſtate; the cell being prepared, the animal ſoon transformed into an aurelia different from that of the common caterpillar, when they begin to break their priſons, above a hundred are excluded in one day; dreadful battles often enſue between the young brood and the progenitors; ſigns previous to their migrations; after the migration, the queen being ſettled, the ſwarm follows, and in a quarter of an hour, the whole body is at eaſe; ſometimes ſacrifice their queen; but never when the hive is full of wax and honey; the working ſort kill the drones in the worm-ſtate, in the cell, and eject their bodies from the hive among the general carnage; upwards of forty thouſand bees found in a ſingle hive; inſtances of expedition in working; in the firſt fifteen days, they make more wax than during the reſt of the year; a hive ſending out ſeveral ſwarms in the year, the firſt always the beſt and moſt numerous; a kind of floating bee-houſe uſed in France, iv. 258 to 270.

Bees, in other countries; in Guadaloupe are leſs by half than in Europe, and have no ſting, ſometimes there are two or three queens to a ſwarm; then the weaker deſerted for the more powerful protector; the deſerted queen does not ſurvive the defeat; is deſtroyed by the jealous rival; and till this be done, the bees never go out to work; at Gaudaloupe their cells are in hollow trees, ſometimes with a ſort of waxen-houſe, ſhaped like a pear, in which they lodge their honey, and lay their eggs; their honey never congeals, is fluid as oil, and has the colour of amber; in the tropical climates are black bees without a ſting; their wax is ſoft, and only uſed for medicinal purpoſes, not being hard enough for candles as in Europe; whether the humble bees have a queen or not, there is one much larger than the reſt, without wings, without hair, all over black, like poliſhed ebony; this views all the works, from time to time; their habits; the honey gathered by the humble bees neither ſo fine, ſo good, nor the wax ſo clear, or ſo capable of fuſion, as thoſe of the common bees, iv. 268 to 273.

Bees, leaf-cutting, make their neſt, and lay their eggs among bits of leaves, iv. 273.

Bees, wall, ſo called, becauſe they make their neſts in walls; the male and females are of a ſize; the former without a ſting, iv. 274.

Bee, wood, iv. 272; *Bee, maſon*, *Bee, ground*, builds its neſt in the earth; the patience and aſſiduity of their labour, 273.

Beetles, a ruminating inſect, or ſeems to ruminate, ii. 39; their general characteriſtics; their kinds diſtinguiſhed from each other; deſcription of the dor-beetle or the May-bug; how the two ſexes in the May-bug are diſtinguiſhed from each other; ſeaſon of their coupling; the female bores a hole into the ground, where to depoſit her burthen; and when lightened of it aſcends from the hole to live as before; their eggs; deſcription of the inſect, and of its manner of life in the worm-ſtate; continues in that ſtate for more than three years, changing every year its ſkin; and living under the ground without eyes; in what manner it aſſumes the form of a cryſalis; time when it becomes winged, and completely formed; the old one never ſurvives the ſeaſon; and dies from the ſeverity of cold in winter; it habits and food, when completely formed; number of their eggs; rooks and hogs particularly fond of them, and devour them in great numbers; inſtances of great devaſtations made by the May-bug; deſcription and habits of that beetle which the Americans call the tumble-dung; the inſect called the king of the beetles; deſcription of the elephant-beetle; the largeſt of this kind hitherto known iv. 291 to 296.

Beggars, a queſtion in the ſchools, which the moſt happy man, the beggar by night, and king by day; or the beggar by day, and king by night, i. 305, 306.

Belcher (Mr.) See *Blood*, i. 336.

Bell, the great diving-bell improved by Dr. Halley; he could write or read in it when the ſea was clear, and eſpecially when the ſun ſhone, i. 169.

Bell, When the ſtag cries, he is ſaid to bell, ii. 98.

Bells, their vibrations not heard under the receiver of an air-pump, i. 193.

Belly, a minute deſcription of the falſe belly of the oppoſſum, ii. 384.

Berries, the Laplanders drink water, in which juniper-berries have been infuſed, i. 348.

Bewailer, or the ſai, a monkey of the new continent, ii. 381.

Bezoar, German bezoar, ii. 74.

Bezoar-goat, the oriental bezoar, ii. 77; cow-bezoar, and monkey-bezoar, 78; hog bezoar, 79.

Billiting, a name given by the huntſmen to the excrement of the fox, ii. 215.

Birch, hares are particularly fond of it, ii. 257.

Birds all produced from the egg, i. 244; their lower eye-lid alone has motion, 276; have the neck longer than any other kind of animals; thoſe which have ſhort claws have alſo ſhort necks; thoſe that have long claws have the neck in proportion, 285; have a power of diſcharging food to feed their young; ruminating birds, ii. 39; many kinds which the dog will not touch, 201; hunters often informed by the birds of the place of the retreat of the fox, 216; a flock of ſmall birds often alarms every thicket, and directs the hunter to the martin, 238; ſurpaſs fiſhes and inſects in the ſtructure of body, and in ſagacity; their anatomy and conformation; compared to a ſhip making way through water; are furniſhed with a gland behind containing a proper quantity of oil; to what purpoſe; deſcription of their feathers; the pectoral muſcles of quadrupeds trifling to thoſe of birds; chooſe to riſe againſt the wind, and why; all except the nocturnal have the head ſmaller, and leſs in proportion to the body, than quadrupeds; their ſight exceeds moſt other animals, and excels in ſtrength and preciſion; have no external ear ſtanding out from the head; the feathers encompaſſing the ear-holes ſupply the defect of the exterior ear; the extreme delicacy of their ſenſe of hearing is eaſily proved by their readineſs in learning tunes, or repeating words, and the exactneſs of their pronunciation; their delicacy in the ſenſe of ſmelling; inſtance of it in ducks; the tail guides their flight like a rudder, and aſſiſts them either in the aſcent or deſcent; wonderful internal conformation; the windpipe often makes many convolutions within the body of the bird, and is then called the labyrinth; of what uſe theſe convolutions are, no naturaliſt has been able to account; this difference obtains in birds to all appearance of the ſame ſpecies; whence ſome derive that loud and various modulation in their warblings is not eaſily accounted for; birds have much louder voices in reſpect to their bulk than animals of other kinds; all have properly but one ſtomach, but different in different kinds; the organs of digeſtion in a manner reverſed in birds; why they pick up ſand, gravel, and other hard ſubſtances; moſt have two appendices or blind-guts; in quadrupeds always found ſingle; all birds want a bladder for urine; their urine differs from that of other animals; effects of the annual molting which birds ſuffer; their molting time artificially accelerated; and how; the manner in which Nature performs the operation of molting; their molting ſeaſon; many live with fidelity together for a length of time; when one dies, the other ſhares the ſame fate ſoon after; the male of wild birds as happy in the young brood as the female; nothing exceeds their patience while hatching; Addiſon's obſervations to this purpoſe; great care and induſtry in providing ſubſiſtence for their young; they feed each of the young in turn, and why; perceiving their neſts or young to have been handled, they abandon the place by night, and provide a more ſecure, though leſs commodious retreat; the young taught the art to provide for their ſubſiſtence; theſe hatched and ſent out earlieſt in the ſeaſon the moſt ſtrong and vigorous, iii. 36 to 50; they endeavour to produce early in the ſpring, and why; efforts for a progeny when their neſts are robbed; ſuch as would have laid but two or three eggs, if their eggs be ſtolen, will lay ten or twelve; the greateſt number remain in the diſtricts where they have been bred; and are excited to migration only by fear, climate, or hunger; cauſe of the annual emigrations of birds; times of migrations; in what order performed; follow the weather rather than the country, and go on as they perceive the atmoſphere more ſuitable to their wants and diſpoſitions; in all countries, longer-lived than quadrupeds or inſects of the ſame climate; ſurpriſing age of ſwans and geeſe; plumage and voice of birds in different zones; all leſs than quadrupeds; the greateſt of one claſs ſurpaſs the greateſt of the other in magnitude; cauſes of the great variety in the middle order of birds; the oſtrich is the greateſt of birds; the humming-bird the ſmalleſt; wild birds generally of the ſame magnitude and ſhape; inferior to quadrupeds in docility; the number already known above eight hundred; difference between land-birds and water-fowls; deſcription of birds of the rapacious kind; the pie kind; the poultry kind; the ſparrow kind; the duck kind; the crane kind, 51 to 59; the cormorant the beſt fiſher; the nauſeous bird or dodo; powers of land-birds of the rapacious kind to obtain their food; ſight of ſuch as prey by day ſurpriſingly quick; ſuch as ravage by night have their ſight fitted to ſee in darkneſs with preciſion; inhabit the moſt lonely places and deſert mountains; appearing in cultivated plains, or the warbling groves, is for depredation; every order of carnivorous birds ſeek for thoſe of the ſize approaching their own; the carnivorous kinds only breed annually, and are leſs fruitful than others; breed but few at a time; where ſupplies of food are difficult, the old ſoon drive the brood from the neſt to ſhift for themſelves, and often deſtroy them in a fury cauſed by hunger; almoſt all birds of prey unſociable; the male and female when neceſſary to each other live together; but they moſt uſually prowl alone; birds with crooked beaks and talons are ſolitary; all males of prey are leſs and weaker than the females; the females are of a greater ſize, more beautiful and lovely for ſhape and colours, ſtronger, more fierce, and generous than the males; it may be neceſſary to be thus ſuperior, to provide for herſelf and her young; theſe birds are lean and meagre; their fleſh is ſtringy and ill-taſted, ſoon corrupting, and flavoured of that animal upon which they ſubſiſt; Belonius aſſerts, many people like the fleſh of the vulture and falcon, and dreſs them for eating; and that the oſprey, when young, is excellent food; five kinds of land-birds of a rapacious nature; whence their diſtinctive mark; bird of heaven, name given by the ancients to the eagle, 76 to 83; the moſt formidable birds of prey reſpect the butcher-bird, 105; the digeſtion of ſuch as live upon mice, lizards, or the like food, not very perfect, 110; Father Kircher ſet the voice of birds to muſic, 111; domeſtic birds of the poultry kind, maintained in our yards, are of foreign extraction, 115; the wilder ſpecies, cooped or caged, pine away, grow gloomy, and ſome refuſe all ſuſtenance; the poultry kind alone grow fat, 117; climate, food, and captivity, three very powerful agents in the alteration in the habits, and the very form of birds; of all birds the cock the eldeſt companion of makind, and the firſt reclaimed from the foreſt, 118; alſo the Perſian bird of Ariſtophanes, 119; deſcription of the tamis or the bird of Numidia, 135; the buſtard the largeſt land-bird, native of Britain, 136; none ſecures its young better from external injury than the toucan, 162; God's bird, the bird of paradiſe, 169; the pigeon for its ſize has the largeſt crop, 184; parakeets the moſt beautiful in plumage, and the moſt talkative birds in nature, 180; ſmall birds mark out a territory to themſelves, which they permit none of their own ſpecies to remain in; at ſome ſeaſons of the year, all ſmall birds migrate from one country to another, or from more inland provinces towards the ſhore; months of their migrations; autumn the principal ſeaſon for catching theſe wanderers; the nets, and the method of catching them; flur-birds; ſinging among birds univerſally the prerogative of the male; ſmall birds fight till one yields his life with the victory; two male birds ſtrive in ſong, till the loudeſt ſilences the other; during the contention, the female ſits an attentive ſilent auditor, and often rewards the loudeſt ſongſter with her company during the ſeaſon; the male, while his mate is hatching ſits upon ſome neighbouring tree, to watch and to ſing; the neſt of ſmall birds warmer than of larger; ſmall birds having finiſhed their neſts, nothing exceeds the cunning they employ to conceal it; worms and inſects the firſt food of all birds of the ſparrow kind; how birds of the ſparrow kind bring forth and hatch their young; manner of life during the rigours of winter; the male of ſmall birds, not finding a mate of his own ſpecies, flies to one of another like him, left out in pairing; a mixed ſpecies between a goldfinch and a canary bird, between a linnet and a lark; theſe breed frequently together, and produce not, like the mules among quadrupeds, a race incapable of breeding again, but one as fruitful as their parents; various birds of the ſparrow kind; many plants propagated from the depoſitions of birds; many of thoſe kinds, which are of paſſage in England, permanent in other countries; and ſome with us conſtant reſidents, in other kingdoms have the nature of birds of paſſage; inſtances of it, 189 to 199; the heron commits the greateſt devaſtation in freſh-waters, 238; the flamingo has the largeſt tongue, 249; birds of various ſorts and ſizes, more than the ſtars in a ſerene night, ſeen in the rock of the Baſs, and in the Firth of Forth, 278; none make a more indifferent figure upon land, or a more beautiful in the water than the ſwan, 299; of all birds known it is the longeſt in the ſhell, 302; an inconteſtable proof that birds have their manners rather from nature than education, 306.

Bird-catchers, ſport by counterfeiting the cry of the owl, iii. 112; nets for, and method of taking ſmall birds, 191.

Biſon and *Urus*, names of deſcendants of one common ſtock; error of the naturaliſts upon this point; the cow and biſon are animals of the ſame kind; deſcription of the biſon; it is ſuppoſed by Klein and Buffon no more than another name for the bonaſus; the breed found in all the ſouthern parts of the world; that breed more expert and docile than ours; many bend their knees to take burdens up, or ſet them down; the reſpect for them in India degenerated into adoration; it is nimble of foot; is eſteemed by the Hottentots; aſſiſts them in attending their flocks and guarding them againſt invaders; is taught to combat the enemies of the nation, and every army of the Hottentots is furniſhed with a herd of them; they procure the Hottentots an eaſy victory before they ſtrike a blow; lives in the ſame cottage with its maſter, and when it dies, a new one is choſen to ſucceed it by a council of the old men of the village, and is then joined with a veteran of its own kind, from whom it learns, becomes ſocial and diligent, and is taken for life into friendſhip and protection; the biſons are found to differ from each other in ſeveral parts of the world; ſome have horns, and ſome are without; they are equally tractable and gentle when tamed; and are furniſhed with a fine, luſtrous, ſoft hair, more beautiful than that of our own breed; their hump of different ſizes, weighing from forty to fifty pounds, more or leſs; cuts and taſtes ſomewhat like a dreſſed udder; the biſons of Malabar, Abyſſinia, Madagaſcar, Arabia, Aſia, Africa, and America; in the courſe of a few generations, the hump wears away; its deſcription; the biſon and the cow breed among each other; the grunting or Siberian cow, and the little African cow or zebu are different races of the biſon, ii. 44 to 54.

Bitch, a pregnant bitch, ſo placed by Mr. Buffon, that her puppies were brought forth in warm water, i. 257; one forgotten in a country-houſe lived forty days without any other nouriſhment than the wool of a quilt ſhe had torn to pieces, ii. 202.

Bittern, or mire-drum, the ſolemnity of its evening-call cannot be deſcribed by words; they are calls to courtſhip or of connubial felicity; it differs from the heron chiefly in colour; its windpipe fitted for the ſound; opinions concerning the cauſe of its boomings; never utters its call in domeſtic captivity; its reſidence; a retired timorous animal; its food, neſt, and eggs; in three days, leads its little ones to their food; differences between the bittern and the heron; its hollow boom conſidered by the vulgar as the preſage of ſome ſad event; inſtance of it; its fleſh greatly eſteemed by the luxurious; it ſeldom riſes but when almoſt trod upon; at the latter end of autumn, in the evening, its wonted indolence forſakes it; is then ſeen riſing in a ſpiral aſcent, till quite loſt from the view, making a ſingular noiſe different from its former boomings; names given to this bird by the Greeks and Latins, iii. 242 to 244.

Bivalve ſhells, iv. 39; all the kinds hermaphrodite, yet require no aſſiſtance towards impregnation, 55; particularly in theſe ſhell-fiſh the pearls are found, 61.

Blackbird, of the ſparrow kind, iii. 196; ſometimes ſeen all over white; its eggs and neſt, 200.

Black-cap, bird of the ſparrow kind, iii. 198; prized by ſome for its ſinging, and is alſo called the mock nightingale, 207.

Blacks, conjectural opinion that the blacks are a race of people bred from one man accidentally black, i. 357; the climate a cauſe obvious and ſufficient to produce blackneſs; nothing ſatisfactory diſcovered upon the cauſe of producing it in human complexions; opinion of Sir Thomas Brown upon the ſubject, 358; whence originally their flat noſes, 360; black parents have procreated two white Negroes, 361.

Bladder, birds have no bladder for urine, iii. 44. See *Fiſhes*, iii. 331, 333.

Blennius, or blenny, deſcription of this fiſh, iii. 332, 399.

Blind, ſuch as live in countries generally covered with ſnow become blind, i. 317; the mole not blind, ii. 303.

Blindworm, its deſcription, iv. 151.

Blood, arterial blood immediately mixed with air in the lungs, is of a fine florid ſcarlet colour; that of the veins returning to the heart, is of a blackiſh crimſon hue; whence this difference of colour proceeds not well underſtood, i. 192; the blood circulates through the bones, as through every other part of the body; Mr. Belcher the firſt who diſcovered it; his experiment to this purpoſe, 336; blood of the rein-deer preſerved in ſmall caſks for ſauce with the marrow in ſpring, ii. 127; the heat of the blood in man and other animals about thirty degrees above congelation; in the marmout and other animals which ſleep the winter, it is not above ten degrees, ii. 278.

Blue-bird deſcribed; its reſidence; is rarely caught; its docility; ſpeaks and whiſtles at the word of command; manner of taking it, iii. 200,—202.

Blue Cat deſcribed, ii. 152.

Bluſhing, whence it proceeds, i. 280.

Boar, wild, varies not his colour as dogs of the domeſtic kind; deſcription; he ploughs the ground like a furrow; his tuſks ſeen almoſt a foot long; they differ from thoſe of the elephant in that they never fall; when the boars come to a ſtate of maturity, they dread no ſingle creature; their poſition when attacked, ii. 131; the manner of hunting them; when killed, the teſticles cut off to prevent their tainting the fleſh, 132; was formerly a native of our country; William the Conqueror puniſhed with the loſs of their eyes ſuch as killed it in his foreſts; at preſent the wild breed is extinct, 135; the Canary boar deſcribed; the tuſks being broken away, the animal abates its fierceneſs and venery, and nearly the ſame effect as caſtration is produced, 144; does not fly at the approach of the lion; combat of a lion and a wild boar, in a meadow near Algiers, 160.

Boback, name of the marmout in Poland, ii. 279.

Bodies, why ſome light bodies ſwim, and ponderous bodies ſink; the deeper a body ſinks, the greater the reſiſtance of the depreſſed fluid beneath; how then, after it has got a certain way, it does ſink at all, i. 111 to 113; animal bodies left to putrefy, produce air copiouſly, 195; ſymmetry of the human body; the body of a well ſhaped man ought to be ſquare, 273; human body often found to differ from itſelf in ſize; inſtance of it; the cauſe; differs alſo from itſelf in weight, 289, 290; thoſe parts furniſhed with the greateſt quantity of nerves, are firſt in formation, 309; the tone of a ſonorous body made to depend upon the number of its vibrations, and not the force, is taking an effect for a cauſe, 320; ſuffering is but to a certain degree; torture becoming exceſſive, deſtroys itſelf; and the mind ceaſes to perceive, when the body can no longer endure, 343.

Boerhaave taxed with marking out to his pupils a little ridge of hills in Holland, as mountains of no ſmall conſideration, i. 83.

Boiguacu, the largeſt of the ſerpent kind in South America; ſometimes forty feet in length, i. 233, 234; deſcription of this creature, iv. 153.

Bonaſus, ſuppoſed by Klein and Buffon another name for the biſon, ii. 46.

Bones, in the embryo, almoſt as ſoft as the muſcles and fleſh, i. 336; hard as the bones ſeem, the blood holds its current through them, as through other parts of the body; in old age more ſolid, alſo more brittle, and why, 337; foſſil bones found on the banks of the Ohio, in Peru and Braſil, ii. 403. See *Blood*, i. 336. See *Bread*, i. 347. See *Fiſh*, ii. 406.

Bonet-Chinois, Mr. Buffon's name of a monkey, ſuppoſed to be a variety of that called malbrouk, ii. 379.

Bonito, deſcription of this fiſh, iii. 404.

Booby, name given by our ſeamen to birds of the penguin tribe, iii. 291.

Borandians, deſcription of them, i. 346.

Boriſthenes, or Nieper, a river, its courſe and ſource, i. 123.

Borneo, the natives hunt the ouran-outang in the ſame manner as the elephant or the lion, ii. 363.

Baroch, in the kingdom of Cambaya, flocks of peacocks ſeen in the fields near that city, iii. 127.

Boſphorus, (the Thracian) was the firſt appropriated, by granting to ſuch as were in poſſeſſion of its ſhore the right of fiſhing in it, i. 136.

Bottom of the ſea in ſome parts not found, and why, i. 168; that of the Red Sea, a foreſt of ſubmarine plants, 167; that of the ſea near America covered with vegetables; a map of the bottom of the ſea between Africa and America, by M. Buache, 168.

Borneo, iſland in the Eaſt Indies, where the babyrouſſa, or Indian hog, is principally found; hog of Borneo, the name given by travellers to the babyrouſſa, ii. 142.

Bowels, of the ruminating animals conſidered as an elaboratory with veſſels in it, ii. 38.

Boyuna, of Ceylon, a kind of ſerpent, iv. 152.

Brain and ſpinal marrow the firſt ſeen in the embryo, i. 309; earth-worm entirely without it, iv. 310, ſome animals live without their brain for weeks, 312.

Brambling, a bird of the ſparrow kind, iii. 197, 198.

Bramins of India have a power of ſmelling equal to moſt creatures; they ſmell the water they drink, though to us quite inodorous, i. 328.

Braſil, black clothes worn there ſoon turn of an iron colour; kept in the ſhops, preſerve their proper hue, i. 181, 182; duck deſcribed, iii. 308.

Bread, twelve ounces of it, and nothing but water, the common allowance, for four and twenty hours, among the primitive Chriſtians of the Eaſt, i. 361, 302; that of the Laplanders compoſed of bones of fiſhes, pounded and mixed with the inſide tender bark, of the pine tree, i. 347.

Bream, deſcription of the ſea bream, iii. 400.

Breaſts in women larger than in men; milk found in breaſts of men as well as of women, i. 286; black women's breaſts, after bearing one child, hang down below the navel; it is cuſtomary among them to ſuckle the child at their backs, throwing the breaſt over the ſhoulder, i. 354.

Breath of the lion is very offenſive, ii. 159; manner of breathing in fiſhes, iii. 328.

Breeze, conſtant breeze produced by the melting of ſnows, i. 200; from ſea increaſes gradually till twelve, ſinks away, and totally huſhed at five; upon its ceaſing, the land breeze begins, increaſes till twelve at night, and is ſucceeded in the morning by the ſea-breeze; cauſe of theſe two breezes; ſometimes the ſea and land breezes come at all hours; the land and ſea-breezes on the coaſts of Malabar and at Congo, i. 201, 202.

Briſſon, his method of claſſing animals, i. 392.

Briſtol, a citizen of it who ruminated his food, ii. 40.

Britons, the ancient, conſidered the hare as an unclean animal, and religiouſly abſtained from it, ii. 261. the cock a forbidden food among them, iii. 119.

Broches, the horns of the ſtag the firſt year, ii. 98.

Brock, the ſtag of the third year, ii. 98.

Brown, (*Sir Thomas*) hoped one day to produce children by the ſame method as trees, i. 244; his opinion upon the cauſe of blackneſs in human complexions, i. 358.

Brun, (*Le*) giving a painter directions about the paſſions, places the principal expreſſion of the face in the eye brows, i. 276.

Bruſh, the name given by huntſmen to the tail of the fox, ii. 215.

Brutes, in thoſe countries where men are moſt barbarous and ſtupid, brutes are moſt active, and ſagacious, ii. 378.

Bubalus, an animal partaking of the mixed natures of the cow, the goat, and the deer; its deſcription; has often been called the Barbary cow, from which its differs widely, ii. 80.

Bubalus, properly a gazelle of Africa, ii. 117.

Bubalus of the ancients, ſuppoſed of the cow kind by Buffon, placed among the lower claſs of ruimnant quadrupeds, ii. 46.

Buccinums, one or two of them viviparous, iv. 49.

Buck, capable of propagating at the age of one year; one buck ſufficient for a hundred and fifty goats; becomes old before his ſeventh year, ii. 66; hunting the buck and the ſtag performed in the ſame manner in England, ii. 97; number of names invented by hunters for this animal; does not change his layer like the ſtag; manner of hunting him is much the ſame as that of ſtag hunting, ii. 106.

Buck goat produces with the ewe an animal that, in two or three generations, returns to the ſheep, retaining no marks of his ancient progenitor, ii. 56.

Buffalo, of the varieties of the cow kind, but two are really diſtinct, the cow and the buffalo; they bear an antipathy to each other; they do not breed among each other, and no animals are more diſtinct and like each other leſs; are in abundance in Guinea and Malabar; it is a great ſwimmer; deſcription of it; the veal of the young is not better eating than the beef of the old; they are natives of the warmer climates; yet are bred in ſeveral parts of Europe, particularly in Italy; the female produces one at a time; continues pregnant for twelve months; is afraid of fire; leather made of its hide is well known for thickneſs, ſoftneſs, and impenetrability; guided by a ring thruſt through the noſe; milk of the female not ſo good as of the cow: two buffaloes yoked draw more than four ſtrong horſes; its fleſh hard and blackiſh, diſagreeable to taſte and ſmell; this animal wild in many parts of India, and dangerous; manner of hunting them; when tamed no animal more patient or humble; inferior in ſize only to the elephant, the rhinoceros, or hippopotamos; the camelopard, or camel, if taller, neither ſo long, nor ſo corpulant; is fond of the water, and croſſes the largeſt rivers with difficulty; has an averſion to red colours that reſemble flame; in thoſe countries where they are in plenty no perſon dreſſes in ſcarlet; they make moſt uſe of their feet in combat, and rather tread their enemies to death than gore them, ii. 46 to 53.

Buffon, (*M.*) his theory of the earth, and a detail of, i. 26 to 29; queſtions that might be aſked this moſt ingenious philoſopher concerning his theory of the earth; he has brought together a multitude of facts relative to the hiſtory of the earth, 29; his ſyſtems about the rudiments of animals, 240; objections againſt it, 241; thinks that women never become bald, 277; his deſcription of the firſt ſenſations of a man juſt brought into exiſtence, pointing out the ſteps by which he arrived at reality, 332.

Buffoon-bird, name our ſailors give the Numidian crane; its peculiar geſtures and contortions; the French call it demoiſelle; it is a very ſcarce bird; the ancients have deſcribed a buffoon-bird, but not meant the Numidian crane, iii. 236.

Bug, the May-bug. See *Beetles.*

Bugs, their habits; deſcribed; are often found coupling tail to tail; manner of deſtroying them; they deſtroy fleas, and devour each other, iv. 180 to 183.

Bulbous, hair is ſo at the root, i. 277.

Bulin, a ſea-ſnail, performs the offices of male and female at the ſame time, iv. 49.

Bull, the gimero, aſſerted to be between the aſs and the bull, ii. 30.

Bullfinch, bird of the ſparrow kind, iii. 197, 198; may be taught to whiſtle to a regular tune, 213.

Bull-head, deſcription of this fiſh, iii. 401.

Bulls, the wild, in Spain mean deſpicable animals; have nothing of that ſternneſs of aſpect remarkable in our bulls, ii. 47.

Bull's-eye, name given by ſailors to a terrible hurricane; deſcribed, i. 207.

Bunting, bird of the ſparrow kind, iii. 197.

Burnet, his theory of the earth; a detail of that work; i. 20, 21.

Buſtard, the largeſt land bird that is a native of Britain; inhabits the open and extenſive plain; is much larger than the turkey, the male generally weighing from twenty-five to twenty-ſeven pounds; its deſcription; places where frequently ſeen in flocks of fifty or more; its food; they have centinels always placed at proper eminences, ever on the watch, to warn the flock of the appearance of danger; are often run down by greyhounds; in what manner; ſeldom wander above twenty or thirty miles from home; the males have a pouch, holding near ſeven quarts of water; they change their mates at the ſeaſon of incubation, about the latter end of ſummer; ſeparate in pairs, if there be a ſufficiency of females for the males; otherwiſe the males fight until one of them falls; in France, ſome of thoſe victims of gallantry found dead in the fields; their neſts; they lay two eggs, almoſt of the ſize of a gooſe-egg; hatch for about five weeks; the young run about as ſoon as out of the ſhell; they aſſemble in flocks in October, and keep together till April; their food in winter; in parts of Switzerland they are found frozen in the fields in ſevere weather; when taken to a warm place, they again recover; uſually live fifteen years, and are incapable of being propagated in a domeſtic ſtate, iii. 136 to 138.

Butcher-bird, its deſcription, with its habits; leads a life of continual combat; intrepidity of this little creature, in going to war with the pie, the crow, and the keſtril, all above four times bigger than itſelf; it fights upon the defenſive, and often comes to the attack with advantage, particularly when the male and female unite to protect their young, and to drive away the more powerful birds of rapine; in what manner they ſally forth againſt them; ſometimes the combat ends with the deſtruction of the aſſailant, and alſo of the defender; the moſt redoubtable birds of prey reſpect them, and they fly in their company without fearing their power or avoiding their reſentment; ſmall birds are its uſual food; and when it has killed the bird or inſect, as aſſerted by the beſt authority, it fixes them upon ſome neighbouring thorn, and when thus ſpitted, pulls them to pieces with its bill; the ſmaller red butcher-bird migrates; the places where they are to be found; their neſts, and the number of their eggs; the female feeds her young with caterpillars and other inſects, but ſoon after accuſtoms them to fleſh procured by the male with great induſtry; their nature very different from other birds of prey in their parental care; for inſtead of driving out their young from the neſt to ſhift for themſelves, they keep them with care, and even when adult do not forſake them; the whole brood thus live in a family together; each family afterwards live apart, and hunt in concert; upon the returning ſeaſon of courtſhip, this union is at an end, the family parts for ever, each to eſtabliſh a little houſehold of his own; the manner of flying is always up and down, ſeldom direct or ſideways; different kinds of this bird, iii. 105 to 107.

Butter, the fat of the maneti ſerves in all caſes inſtead of butter, ii. 353.

Butterfly, ſome kinds actually live upon little or nothing, i. 298; one of the principal ornaments of oriental poetry; in thoſe countries, the inſect is larger and more beautiful than with us; eaſily diſtinguiſhed from flies of every other kind by their wings; Linnæus has reckoned up above ſeven hundred and ſixty different kinds, yet the catalogue is incomplete; number and beautiful colours of its wings; butterflies can diſcover their mates at more than a mile diſtance; deſcription of the head, corſelet, and body; the eyes have not all the ſame form; but the outward coat has a luſtre, in which may be diſcovered all the colours of the rainbow; when examined cloſely, it has the appearance of a multiplying glaſs; the uſe of their horns or feelers as yet unknown; uſe of their trunks; difference between butterflies and moths; they often perceive the approach of the female at above two miles diſtance; by what ſenſe is not eaſy to conceive; it has no organs for ſmelling; the female is larger than the male; if diſturbed while united, the female flies off with the male on her back, entirely paſſive upon the occaſion; after junction, they depoſit their eggs and die; all females of this tribe are impregnated by the male by one aperture, and lay their eggs by another; every butterfly chooſes for her brood, inſtead of the plant moſt grateful in its winged ſtate, that which it has fed upon in its reptile form; how they keep their eggs warm, and alſo entirely concealed; many do not lay till the winter warns them of their approaching end; ſome continue the whole winter in hollows of trees, and do not provide for poſterity until the beginning of April, then leave their retreats, depoſit their eggs, and die, iv. 241 to 247. See *Aurelia*, iv. 237, 238.

Buttock, in man, different from that of all other animals, i. 287.

Buzzard, a ſluggiſh inactive bird; often remains perched whole days upon the ſame bough; lives more upon frogs, mice and inſects, than upon birds more troubleſome to ſeize; its manner of living in ſummer; ſo little capable of inſtruction, that it is a proverb to call one obſtinately ignorant, a buzzard; the honey-buzzard, the moor-buzzard, and the hen-harrier, are of this ſtupid tribe, and differ chiefly in their ſize, iii. 103, 104.

Byron (*Commodore*) our laſt voyager that has ſeen the gigantic race of mankind, i. 372.

C.

Cabiai, the ſame animal as the capibara, ii. 140.

Cachalot, a fiſh ſaid to purſue a ſhoal of herrings, and to ſwallow thouſands at a gulp, iii. 327; it has generally gone under the name of the ſpermaceti whale, till Mr. Pennant made the diſtinction, borrowing its name from the French; ſeven diſtinctions in this tribe; deſcription; the throat of this animal very formidable; with eaſe it could ſwallow an ox; it terrifies the dolphins and porpoiſes ſo much, as often to drive them on ſhore; it contains two precious drugs, ſpermaceti and ambergris; the oil of this fiſh is eaſily convertible into ſpermaceti, by boiling it with a ley of pot-aſh, and hardening it in the manner of ſoap; candles are now made of it; the balls of ambergris not found in all fiſhes of this kind, but chiefly in the oldeſt and ſtrongeſt, iii. 353 to 355.

Cagui, or the ſaki, is the largeſt monkey of the ſagoin kind; its deſcription, ii. 381.

Cajeta, a mountain near it, was ſplit by an earthquake, i. 94.

Cairo, in what manner they produce there ſix or ſeven thouſand chickens at a time, iii. 123.

Calao, the horned Indian raven, iii. 156.

Calcination, all animal ſubſtances when calcined are the ſame, iv. 91.

Calf, name given to the young of the hind, or the female of the ſtag, ii. 95.

Calf, or hind-calf; the ſtag called ſo the firſt year. ii. 98.

Callitrix, the green monkey of St. Jago, of the ancient continent; its deſcription, ii. 379.

Callyonymus, the dragonet; deſcription of this fiſh, iii. 399.

Calms, attended with deluges of rain; why, and where, i. 199.

Camblet, made of hair of animals about Angora, ii. 68.

Camel, a ruminating animal, ii. 39; camel and dromedary not two diſtinct kinds, only a variety of the ſame, which has ſubſiſted time immemorial; the only ſenſible difference between thoſe two races, they produce with each other, and the mixed breed is conſidered the beſt; of the two the dromedary is far the moſt numerous; countries where the camel and dromedary are found; neither can ſubſiſt, or propagate, in the climates towards the north; Arabia the moſt adapted to the ſupport and production of this animal; the camel the moſt temperate of all animals; it can continue to travel ſeveral days without drinking, and is often ſix or ſeven days without any ſuſtenance; its feet formed to travel upon ſand, and utterly unfit for moiſt or marſhy places; many vain efforts tried to propagate the camel in Spain; they have been tranſported into America, but have multiplied in neither; they might perhaps produce in theſe countries, but would in a few years degenerate; their ſtrength and their patience would forſake them; and inſtead of enriching, become a burthen to their keepers; uſes to which this animal is put among the Arabians; its education; it has a fifth ſtomach, has a reſervoir, to hold a greater quantity of water than immediately wanted; when the camel finds itſelf preſſed with thirſt, it throws up a quantity of this water by a ſimple contraction of the muſcles, into the other ſtomachs; travellers, when ſtraitened for water, have often killed their camels for what they expected to find within them; countries where commerce is carried on by means of camels, trading journies in caravans; their food; purſue their way when the guides are utterly aſtray; its patience and docility when loaded; in what manner the female receives the male; one male left to wait on ten females, the reſt caſtrated; they live from forty to fifty years; every part of this animal converted to ſome uſeful purpoſe; its very excrements are not uſeleſs; their burthen; iii. 5 to 10.

Cameleon, its dimenſions and appetites; has a power of driving the air it breathes over every part of the body, iv. 113; changes of its colour; it is an error that it aſſumes the colour of the object it approaches; deſcription of it by Le Bruyn, iv. 114; it often moves one eye, when the other is at reſt; ſometimes one eye ſeems to look directly forward, while the other looks backward; and one looks upward, while the other regards the earth, iv. 115.

Camelopard, deſcribed, dimenſions of a young one; inhabits the deſerts of Africa; no animal from its diſpoſition, or its formation, leſs fitted for a ſtate of natural hoſtility; it lives entirely upon vegetables, and when grazing, ſpreads its fore legs wide to reach the paſture; known to the ancients, but rarely ſeen in Europe; often ſeen tame at Grand Cairo, in Egypt; Pompey exhibited at one time ten upon the theatre, ii. 411, 412.

Camerarius, his deſcription of the perfections a horſe ought to poſſeſs, ii. 22.

Canada, above thirty thouſand martins, ſkins annually imported from that country to England, ii. 238.

Canal. See *Blood*, i. 336. See *Fœtus*, iv. 64.

Canary-bird, taught to pick up the letters of the alphabet at the word of command, to ſpell any perſon's name in company, iii. 57; by the name, originally from the Canary Iſlands; comes to us from Germany, where they are bred in numbers; at what period brought into Europe is not known; about a century ago they were ſold at very high prices, and kept only for the amuſement of the great; in its native iſlands it is of a duſky grey colour, and ſo different from thoſe ſeen in Europe, as to raiſe a doubt about its ſpecies; rules and inſtructions for breeding them in a domeſtic ſtate, apparatus for breeding in Germany; food the old ones muſt be ſupplied with, when the young ones are excluded; ſo prolific are theſe birds ſometimes, that the female will be ready to hatch a ſecond brood before the firſt is able to quit the neſt; this bird kept in company with the linnet or gold-finch, pairs and produces a mixed breed, moſt like the canary-bird, and reſembling it in its ſong, 210 to 213.

Canary boar deſcribed, ii. 144.

Cancerous, breaſts cured by the ſucking of the rubeth, or the land toad, iv. 87.

Candle, quickly extinguiſhes in an exhauſted receiver, and why, i. 192.

Cannons, filled with water, and left to freeze, burſt, i. 106.

Cantharides, well known in the ſhops by the name of Spaniſh flies, and for their uſe in bliſters; their deſcription, with the differences from each other; the countries where, and trees on which they are ſeen; it is reported, that the country people expect the return of theſe inſects every ſeven years; their bad ſmell is a guide for thoſe who catch them; they ſmell ſo diſagreeable, as to be perceived at a great diſtance, eſpecially about ſun-ſet; though not ſeen at the time; they yield a deal of volatile cauſtic ſalt; their qualities; the effects fall principally upon the urinary paſſages; in what manner they are killed, iv. 298, 299.

Cape de Verde iſlands; a ſouth-wind prevails in them during the month of July, i. 200.

Cape of Good Hope, a north-weſt wind blows there during the month of September, i. 200; at the Cape of Good Hope, it is cuſtomary to hunt the elephant for its teeth; in what manner; account of an unhappy huntſman, ii 402.

Capibara, or cabiai, an animal reſembling a hog of about two years old; its deſcription; ſome naturaliſts have called it the water-hog; and why; a native of South America, and chiefly frequenting the borders of lakes and rivers; like the otter, it ſeizes the fiſh, upon which it preys, with its hoofs and teeth; live alſo upon fruits, corn, and ſugar-canes; its cry reſembles the braying of an aſs, more than the grunting of a hog; its only place of ſafety is the water; into which it plunges when purſued; and keeps ſo long at the bottom, that the hunter can have no hopes of taking it there; when young is eaſily tamed; its fleſh has a fiſhy taſte, but its head is ſaid to be excellent, ii. 141, 142.

Capons, taught to clutch a freſh brood of chickens throughout the year, iii. 123.

Capon of Pharaoh, ſuppoſed the true ibis; is a devourer of ſerpents, and follows the caravans that go to Mecca, to feed upon the offal of the animals killed on the journey, iii. 233.

Caracal, or the ſiaguſh, a native of the Eaſt Indies, reſembles the lynx in ſize. ii. 177.

Caracol, a town ſituated at the foot of the Andes, i. 88.

Caraguata, a plant in the Weſt Indies which clings round the tree it happens to be near; it keeps away that nouriſhment deſigned to feed the trunk, and at laſt entirely deſtroys its ſupporter, i. 233.

Carapo, deſcription of this fiſh, iii. 402.

Caraſſa, a volcano in South America, i. 62.

Caravan, a ſingle lion of the deſert often attacks an entire caravan, ii. 155; the aſſemblage called a caravan ſometimes compoſed of numbers amounting to ten thouſand, iii. 8.

Carcajou, name given by the North Americans to the glutton; its manner of killing the rein-deer, ii. 129.

Caribou, name the North Americans give the rein-deer, ii. 120.

Carli, (Father). See *Monkey*, ii. 378.

Carnivorous animals, there is one claſs that purſue in a pack, and encourage each other by their mutual cries; ſupport a ſtate of famine for ſeveral weeks together, i. 406; milk in thoſe animals is more ſparing than in others, i. 413. See *Animals*, ii. 37 to 39.

Carnivorous birds ſeek for ſuch as are of the ſize moſt approaching their own, iii. 78. See *Birds*.

Carp, an experiment made with this fiſh in a large vaſe of water, under an air-pump, iii. 329; one found by Buffon not leſs than a hundred years old; this diſcovery confirmed by other authors, 332; continues in the egg not above three weeks, 334; Mr. Tull famous for his invention of ſpaying carp to give it a fine flavour, 335; its deſcription, 404; the method of fattening it in a damp cellar; it has been known thus to live for a fortnight, to grow exceedingly fat, and to get a ſuperior flavour, 406.

Carriers, pigeons uſed to carry letters, iii. 186.

Carrion-crow, reſembles the raven in its appetites, its laying, and manner of bringing up its young, iii. 153.

Carteſius, his theory to explain the invariable motion of the winds, not quite ſo abſurd as that of Dr. Lyſter, i. 197.

Carthagena, in America; the heat of its climate affects the ſpeech of its inhabitants, which is ſoft and ſlow, and their words generally broken; more than three parts of our army deſtroyed by the climate, in our unſucceſsful attack upon it, i. 186.

Carthamus, or baſtard ſaffron, ſtrongly purgative to man; parrots very fond of it, iii. 180.

Cartilage, the thyroid cartilage, i. 285, 286; cartilages in youth elaſtic, and pliant in age, become at laſt hard and bony, and why, 337.

Cartilaginous fiſhes; their general conformation; ſuppoſed they grow larger every day till they die; their internal ſtructure; are poſſeſſed of a two-fold power of breathing; apertures by which they breathe; the cartilaginous ſhark or ray live ſome hours after they are taken; fiſhes of this tribe can remain under water, without taking breath; and can venture their heads above the deep, and continue for hours out of their native element; their ſeaſon and manner of copulating; and of bringing forth; little difference between the viviparous and the oviparous kinds, in this claſs of fiſhes; five diviſions of the cartilaginous fiſh, iii. 360 to 363.

Caſſowary, a bird firſt brought into Europe by the Dutch from Java, in the Eaſt Indies, where only it is found; its deſcription; the part which moſt diſtinguiſhes this animal is the head, which inſpires ſome degree of terror; its internal parts deſcribed; it has the head of a warrior; the eye of a lion, the defence of a porcupine, and the ſwiftneſs of a courſer; is not fierce in its natural character; how it defends itſelf; extraordinary manner of going; the Dutch aſſert that it can devour glaſs, iron, and ſtones, and even live and burning coals, without the ſmalleſt fear, or the leaſt injury; the largeſt of its eggs is fifteen inches round one way, and twelve the other; places where this animal is found; it has not multiplied in any conſiderable degree, as a king of Java made a preſent of one to the captain of a Dutch ſhip, as a rarity, iii. 71 to 74.

Catacombs of Egypt, i. 381.

Catamountain, hunts for the hare or the rabbit, i. 404; the ocelot of Mr. Buffon; its deſcription, ii. 176; is one of the fierceſt, and, for its ſize, one of the moſt deſtructive animals in the world, 279, 280.

Catanea, a city utterly overthrown by an earthquake, i. 69.

Cataphractus, or kabaſſou, is one of the largeſt kinds of the armadilla, ii. 325.

Cataracts of the Rhine, and of the Nile; the cataract of the river Velino, in Italy, is above a hundred and fifty feet perpendicular; a cataract near the city of Gottenburg in Sweden; other cataracts, i. 130.

Cataract of the eye, Mr. Cheſelden having couched a boy of thirteen, who to that time had been blind, and at once having reſtored him to ſight, curiouſly marked the progreſs of his mind upon the occaſion, i. 313.

Caterpillars, their differences from all other inſects; all theſe animals are hatched from the eggs of butterflies; during winter, the greateſt number of caterpillars are in an egg ſtate; in the aurelia ſtate, they are ſeemingly deprived of life and motion; ſome do not make any change at the approach of winter, but chooſe themſelves ſome retreat, and there remain quite motionleſs, and as inſenſible as if actually dead; caterpillars of this kind are found in great numbers together, incloſed in one common web that covers them all; there are ſome of the kind, whoſe butterflies live all the winter, and where; a ſingle caterpillar eats double its own weight of leaves in a day, and ſeems no way diſordered by the meal; the body of the caterpillar anatomically conſidered; avidity with which they feed; number of their ſtigmata, or thoſe holes through which the animal is ſuppoſed to breathe; it has eighteen lungs; the experiment of Malpighi to aſcertain their uſe; all caterpillars ſpin at one time or another; many of them change their ſkins five or ſix times in a ſeaſon; and in what manner; change into an aurelia; their retreats in that ſtate, 226 to 237; there are thouſands of fiſhes, birds, and inſects, that live chiefly upon caterpillars; a ſingle ſparrow and its mate, that have young ones, deſtroy above three thouſand caterpillars in a week; ſome of the kind, fitted only to live upon leaves and plants, will eat each other, in preference to their vegetable food; the bodies of the larger kinds ſerve as a neſt to various flies, that very carefully depoſit their eggs in them; number of worms remain within the body of the caterpillar, devouring its entrails without deſtroying its life; the ichneumon tribe is not the caterpillar's offspring, as ſuppoſed, but its murderers, 247 to 250.

Cat-fiſh, its deſcription, iii. 400.

Cats, the wild hunt for the ſquirrel or the mouſe, i. 404; the whole tribe ſeek their food alone, and never unite for mutual ſupport; and, except at certain ſeaſons, are enemies to each other; all of the cat kind devour nothing but fleſh; and ſtarve upon any other proviſion; their greateſt force lies in the claws; the cat goes with young fifty-ſix days, and ſeldom brings forth above five or ſix at a time; the male often devours the kittens; before they are a year old they are fit to engender; the female ſeeks the male with cries; nor is their copulation performed without great pain, and why; cats hunt the ſerpents in the Iſle of Cyprus; any animal weaker than themſelves, is to them an indiſcriminate object of deſtruction; the mouſe is their favourite game, and they patiently watch a whole day until the mouſe appears; a flagrant mark by which the cat diſcovers its natural malignity; their eyes ſee better in darkneſs than light; and why; if the inhabitant quits the houſe, the cat ſtill remains; is exceſſively fond of ſome plants, ſuch as valerian, marum, and catmint; particularly loves fiſh; its ſleep is very light; its hair ſends forth ſhining ſparks, if rubbed in the dark; the wild breed with the tame; deſcription of the wild cat; inhabits the moſt mountainous and woody parts, lives moſtly in trees, and feeds only by night; the cat was much higher in eſteem among our anceſtors than it is at preſent; laws of Howel, concerning the price of cats; cats were not naturally bred in our foreſts; of all quadrupeds, the wild cat is, perhaps, that whoſe inteſtines are proportionably the ſmalleſt and the ſhorteſt, and why; common to the new continent as well as the old; the blue-cat, the lion-cat, or, more properly, the cat of Angora; the cats in Syria and Perſia remarkable for their long, ſoft hair, iii. 145 to 153; all the cat kind are kept off by the fires which the inhabitants light to preſerve their herds and flocks; and they hunt rather by the ſight than the ſmell; it happens that the lion purſues the jackall or the wild dog, while they are hunting upon the ſcent and merely for themſelves; the lion is then an unwelcome intruder upon the fruits of their toil; from thence, probably, has ariſen the ſtory of the lion's provider, 158; the lion devours a great deal at a time, and generally fills himſelf for two or three days to come; in the deſerts and foreſts, his moſt uſual prey are the gazelles, and the monkeys, 159; the race of cats noxious in proportion to their power to do miſchief; inhabit the moſt torrid latitudes of India, Africa, and America, and have never been able to multiply beyond the torrid zone, 177; they ſeldom attack man, though provoked; of all animals theſe are the moſt ſullen, and, to a proverb, untameable, 178; different claſſes of the kind from the lion to the cat, 182; the wild cat and the martin ſeldom meet without a combat; it is not a match for the martin, 236; the cat of Pharaoh injudiciouſly called the ichneumon, 240; cats of Conſtantinople, a name of the genet, and why, 245.

Cattle, we have the beſt breed of horned cattle in Europe, ii. 43; the large hornleſs breed in ſome parts of England, originally from Poland, ii. 43; the the Dutch bring great quantities of lean cattle from Denmark to fatten on their own rich grounds; that of Ukraine becomes fat, and is conſidered the largeſt breed of all Europe; in Switzerland theſe animals grow to a large ſize; not ſo in France; ſize in Barbary, Ethiopia, Perſia, and Tartary, 47; leather-mouthed cattle, 61; liable to be deſtroyed by the South American bat, vampyre, ii. 332.

Caverns, the amazing cavern of Eldenhole in Derbyſhire; the dreadful cavern in the country of the Arrian Indians, called the Gulph of Pluto, deſcribed by Ælian; cavern of Maeſtricht; its deſrciption; no part of the world has a greater number of artificial caverns than Spain; in general deſerted by every race of meaner animals, except the bat; the caverns called Oakley-hole, the Devil's-hole, and Penpark-hole in England; the cavern of Antiparos, and its diſcovery; how natural caverns formed; two hundred feet as much as the loweſt of them is found to ſink, i. 41 to 48; one in Africa, near Fez, continually ſends forth ſmoke or flames, 62.

Caviar, the inhabitants of Norway prepare from eggs, found in the body of the porpeſs, a ſavoury liquor, which makes a delicate ſauce, and is good when eaten with bread, iii. 359; it is made with the roe of the ſturgeon; more in requeſt in other countries of Europe than with us; and is a conſiderable merchandize among the Turks, Greeks, and Venetians; manner of making it, iii. 386, 387.

Cauſes, the inveſtigation of final cauſes a barren ſtudy; and like a virgin dedicated to the Deity, brings forth nothing, i. 19.

Cauſtic, cantharides yield a great deal of volatile cauſtic ſalt, iv. 299.

Cayman, a ſort of crocodile, iv. 96.

Cayopolin, a kind of oppoſſum; its deſcription, ii. 387.

Cea, an iſland waſhed away with ſeveral thouſand inhabitants, i. 81.

Cells, made by the bees, iv. 261.

Cenere, a mount of recent appearance, i. 97.

Centinel. See *Animals*, i. 406. See *Marmouts*, ii. 277. See *Buſtard*, iii. 137.

Centipes, the ſcolopendra, iv. i. 191.

Centriſcus, a kind of cartilaginous fiſh, iii. 392.

Cephus, name given by the ancients to the monkey now called mona, ii. 79.

Cepola, the deſcription of this fiſh, ii. 400.

Cerigo, an iſland of the Archipelago, where many wild aſſes are found, ii. 24.

Cetaceous fiſhes, the whale and its varieties reſemble quadrupeds in their internal ſtructure, and in ſome of their appetites and affections; they are conſtrained every two or three minutes to come up to the ſurface to take breath, as well as to ſpout out through their noſtril, for they have but one, that water which they ſucked in while gaping for their prey; the ſenſes of theſe animals ſuperior to thoſe of other fiſhes; and it is moſt likely that all animals of the kind can hear; they never produce above one young, or two at the moſt; and this the female ſuckles in the manner of quadrupeds, her breaſts being placed, as in the human kind above the navel; diſtinctive marks of this tribe, iii. 336 to 339.

Chacrelas, white men go by that name in the Eaſt Indies, i. 361.

Chætodon. See *Cat-fiſh*, iii. 400.

Chaffinch, a bird of the ſparrow kind, iii. 197, to 199; time of emigration of the hen, 52.

Chapotonadas, a diſtemper in America, i. 187.

Charles XII. when ſhot at the ſiege of Frederickſhall, was ſeen to clap his hand on the hilt of his ſword, i. 343.

Charoſſi, the only ſort of horſes for hunting lions, ii. 160.

Charybdis, a gulph, Nicola Peſce jumped into it, continued for three quarters of an hour below, and at laſt appeared holding a golden cup in one hand, and making his way among the waves with the other; deſcription of this gulph, i. 171, 172.

Chaſe, men of every age and nation have made that of the ſtag a favourite purſuit; in our country it was ever eſteemed a principal diverſion of the great, ii. 95; theſe ſports reſerved by ſovereigns for particular amuſement, and when; in the reigns of William Rufus and Henry the Firſt, it was leſs criminal to deſtroy a human being than a beaſt of chaſe; ſacred edifices thrown down for room to beaſts of chaſe, ii. 96; chaſe of the ſtag, as performed in England; terms uſed by hunters in that chaſe, 97, 98; the ſame in Sicily; and in China, 102; chaſe of the fox; cant terms uſed by the huntſmen in it, 214, 215;

of all varieties, that of the oſtrich the moſt laborious, is alſo the moſt entertaining; deſcription of it, iii. 67.

Chaſms, amazing in the Alps, and ſtill more in the Andes, i. 40; cauſes that produce chaſms or fiſſures, 42.

Chatterer, a bird, native of Germany; its deſcription, iii. 159, 160.

Cheeſe, the inhabitants of Canada uſe no other than the milk of the hind, or the female of the ſtag, ii. 104; thoſe of Lapland little and well taſted; never breed mites, ii. 126.

Cheops, the oldeſt meaſure of the human figure in his monument, in the firſt pyramid of Egypt, i. 374.

Cheſelden. See *Cataract*, i. 313 to 315.

Chevrotin, or little Guinea Deer, the leaſt of all cloven-footed quadrupeds, and perhaps the moſt beautiful; is moſt delicately ſhaped; its deſcription; native of India, Guinea, and the warm climates between the tropics; the male in Guinea has horns; but the female is without any; they chiefly abound in Java and Ceylon, ii. 81, 22.

Cheney, ſuſpected the quantity of water on the earth daily decreaſing, i. 108.

Chicken, an amazing hiſtory of it in the egg, by Malpighi and Haller, i. 245; in what manner ſix or ſeven thouſand are produced at a time, at Grand Cairo; capons clutch a freſh brood of chickens throughout the year, iii. 123.

Child, hiſtory of the child in the womb, i. 251 to 256; children of Negroes able to walk at two months old, at leaſt to move from one place to another, 260; ſkin of children newly brought forth, is always red, and why; the ſize of a new-born infant about twenty inches, and its weight twelve pounds, 261; in cold countries continue to be ſuckled for four or five years together, 262; child's growth leſs every year till the time of puberty, when it ſeems to ſtart up of a ſudden, 263; in ſome countries ſpeak ſooner than in others, and why; children of the Italians ſpeak ſooner than thoſe of the Germans; various methods pointed out to improve the intellects of children, 265; white children frequently produced from black parents; but never black children from two whites, 361; inherit the accidental deformities of their parents; inſtances of it, 360; many inſtances of the child in the womb being marked by the ſtrong affections of the mother; how performed is not known; hard to conceive that the child in the womb, ſhould take the print of the father's features, 365.

Chimborazo, a remarkable mountain in South America, i. 191.

Chineſe, have neither flats nor ſharps in their muſic, i. 321; their horſes weak, little, ill-ſhaped, and cowardly, ii. 17; deſcription of that people, 350, 351.

Chroſan, in Perſia, bodies previouſly embalmed, and buried in the ſands of that country, preſerved from corruption a thouſand years, i. 380.

Chough, deſcription of the Corniſh Chough, iii. 153.

Chriſtopher, (St.) See *Fiſh*, iii. 153.

Chryſalis, or the *aurelia*, iv. 234.

Chryſes, an iſland ſunk near Lemnos, i. 81.

Cicero, a long poem of his in praiſe of the halcyon, of which but two lines remain, iii. 315.

Circaſſians, deſcribed, i. 355.

Circe, an enchantreſs, armed her ſon with a ſpear headed with the ſpine of the trygon, iii. 375.

Circulation of the blood. See *Blood*, i. 336, 337.

Civet, the ſpecies diſtinguiſhed into two kinds; Mr. Buffon calls one the civet the other the zibet; diſtinctions between the two kinds; the civet thirty inches long; both civet and zibet conſidered as varieties of the ſame animal, as former naturaliſts have done; the civet reſembles the weaſel kind, in what; differs from them, in what; the opening of the pouch or bag, the receptacle of the civet; manner of taking the civet from the pouch; although a native of the warmeſt climates, this animal lives in temperate and even cold countries; kinds of food it likes beſt; drinks rarely, yet it makes urine often; and, upon ſuch occaſions, the male is not diſtinguiſhable from the female; numbers of theſe animals bred in Holland, and the perfume of Amſterdam reckoned the pureſt of any; the quantity greater, proportionably to the quality and abundance of the food; this perfume ſo ſtrong that it communicates to all parts of the animal's body; to its fur and ſkin; manner of chooſing the perfume; the places of conſiderable traffic in it; the animal irritated, its ſcent becomes greater; and tormented, its ſweat is ſtill ſtronger, and ſerves to adulterate or encreaſe what is otherwiſe obtained from it; civet a more grateful perfume than muſk; ſold in Holland for fifty ſhillings an ounce; its eyes ſhine in the night; ſees better in the dark than by day; breeds very faſt in climates where heat conduces to propagation; thought a wild fierce animal, never thoroughly familiar; lives by prey, birds and animals it can overcome; its claws feeble and inflexible; this perfume quite diſcontinued in preſcription, ii. 245 to 248.

Clavicles, or collar-bones, what animals have them; Mr. Buffon ſays none but monkeys, but this is an overſight, i. 286.

Claws of the lion give a falſe idea of its power; we aſcribe to its force the effects of its arms, i. 291; the weaſel kind neither draw in, nor extend their claws, as cats do, ii. 224; thoſe of the civet feeble and inflexible, 248.

Climates, calamities in thoſe where the air is condenſed by cold, i. 188; cauſe obvious and ſufficient to produce blackneſs of Negroes, 358; complexions of different countries darken in proportion to the heat of the region; next to human influence, the climate has the ſtrongeſt effects upon the nature and form of quadrupeds, 408; thoſe exceſſively hot, unfavourable to horſes, ii. 17; in general, water-fowls of no particular climate, iii. 296.

Cloth, now made worſe than ſome years paſt; Flemings poſſeſſed the art of cloth-working in a ſuperior degree, ii. 60

Clove-trees, cut down by the Dutch at Ternate to raiſe the price of the ſpice; ſoon had reaſon to repent of their avarice, i. 188.

Clouds, the fore-runners of a terrible hurricane, called by the ſailors the bull's eye, i. 207; daſhing againſt each other produce electrical fire; water evaporates, and riſing, forms clouds; the theory upon it; that of Dr. Hamilton; the author's theory of evaporation, 211, 212; at once pour down their contents and produce a deluge; reflecting back images of things on earth, like mirrors, 217.

Clupea, or *herring*, its deſcription, iii. 403.

Coaiti, a monkey of the new continent, deſcribed, ii. 380.

Coan, the name of a dwarf lately dead at Chelſea, i. 368.

Coaſt of Italy is bordered with rocks of marble of different kinds; thoſe of France, from Breſt to Bourdeaux, and Spain, compoſed of rocks, i. 157, 158; of the ſea, have peculiar winds, 200; deadly winds all along thoſe of the Perſian Gulph, and thoſe of India, 206.

Coatimondi, extreme length of its ſnout; its deſcription; very ſubject to eat its own tail; its habits, iii. 22, 23.

Cobitis, the loach, deſcription of this fiſh, iii. 404.

Cobra di Capello, a kind of ſerpent, iv. 135, 145, 148.

Cochineal, deſcription of this inſect, as in our ſhops brought from America; difference between the domeſtic and the wild cochineal; precautions uſed by thoſe who take care of theſe inſects; the propagator has a new harveſt thrice a year; various methods of killing them; produce different colours as brought to us; our cochineal is only the females; uſed both for dyeing and medicine, iv. 300, 301.

Cock, of all birds the cock the oldeſt companion of man, and firſt reclaimed from the foreſt; ſpecies of cock from Japan, covered over with hair inſtead of feathers; the weſtern world had the cock from Perſia; Ariſtophanes's cock the Perſian bird; it was one of the forbidden foods among the ancient Britons; Perſia that firſt introduced it to us, no longer knows it in natural form; countries where it is wild; peculiarities, in a wild condition; another peculiarity in thoſe of the Indian woods, their bones, when boiled, are as black as ebony; the Athenians had cock-matches as we; no animal of greater courage, when oppoſed to one of his own ſpecies; in China, India, the Philippine iſlands, and over the Eaſt, cock-fighting the ſport and amuſement of kings and princes; cocks in China as bold, or bolder, than ours; and of more ſtrength with leſs weight; its great courage proceeds from being the moſt ſalacious of all birds; a ſingle cock ſuffices for a dozen hens; and is the only animal whoſe ſpirits are not abated by indulgence; ſoon grows old, and in three or four years becomes unfit for the purpoſes of impregnation; how long cocks live, left to themſelves, not well aſcertained; Aldrovandus makes their age to be ten years; are injured, as Linnæus aſſerts, by elder-berries, iii. 118 to 124; the black chiefly found in heathy mountains, and piny foreſts, 138; cock of the wood, ſee *Woodcock*.

Cockle, a bivalved ſhell-fiſh, iv. 60.

Cocoa, the elephant eats the plants to the roots, ii. 393.

Cod, from the banks of Newfoundland, purſues the whiting, which flies before it to the ſouthern ſhores of Spain, iii. 327; ſpawns in one ſeaſon, as Lewenhoeck aſſerts, have nine millions of eggs or peas, contained in a ſingle roe, 333; its deſcription, 402; fiſhery in Newfoundland, 409.

Cold, promotes evaporation, although diminiſhing the force of menſtruums, i. 212; extremity of it not leſs productive of tawny complexions than that of heat, 359; exceſſive, preſerves bodies from corruption, 379; ſome fiſhes rendered ſo torpid by cold in northern rivers, as to be frozen up in the maſſes of ice, where they continue for months together, without life or ſenſation, priſoners of congelation, waiting a warmer ſun to reſtore them to life and liberty, iii. 421.

Collar-bones, what animals have them, i. 286.

Colliers, eight dropped down dead by the vapour of the mines in Scotland, as if ſhot, i. 52.

Colour, none refreſhes the ſight ſo well as green, i. 17; of the ſea, not from any thing floating in it, but from different reflexions of rays of light; the proof, 169; different colours of the eye, 275; whence proceeds the tawny of the North American Indians, 358, 359; different of the waters of the ſame ſea, 159; hair takes its colour from juices flowing through it, 277; that of the object contributes to form an idea of the diſtance at which it appears, 315; of all thoſe by which mankind is diverſified, ours moſt beautiful to the eye, and moſt advantageous, 356; thoſe changes the African, the Aſiatic, or the American undergo in their colour, are but accidental deformities, which might probably be removed, 362; nothing exceeds the delicate regularity of thoſe of the zebra, ii. 31; change of colour in the hair obtains, in ſome degree, in all quadrupeds, 28; different in ſeveral parts of the fur of the ſable, 239.

Comets, their number much greater than that of the planets; they roll in orbits; experience has not ſufficiently confirmed the truth of the inveſtigation about their returning periods, i. 11.

Complexion, extremity of cold not leſs productive of a tawny than that of heat; not eaſy to conceive how the ſun whitens wax and linen, and darkens the human complexion; the ſun not the only cauſe of darkening it, i. 358, 359.

Compte's, (Le) account of an ape he ſaw in the ſtraits of Molucca, ii. 360.

Concretions, ſcarce an animal, or a part of their bodies, in which concretions are not formed; experience has found but few cures by the efficacy of theſe concretions; often prove fatal to the animal that bears them, ii. 78.

Condamine, (La) knows a fiſh poſſeſſed of the powers of the torpedo, and every way reſembling a lamprey, 379, 380.

Condomar, anomalous animal of the goat kind; its deſcription, ii. 80, 81.

Condor, poſſeſſes in a higher degree than the eagle, all the qualities that render it formidable to the feathered kind, to beaſts, and to man himſelf; is eighteen feet acroſs the wings extended, according to Acoſta, Garcilaſſo, and Deſmarchais; the beak ſo ſtrong as to pierce the body of a cow; two of them able to devour it; they do not abſtain from man himſelf; fortunately there are few of the ſpecies; the Indians believe that they will carry off a deer, or a young calf in their talons, as eagles would a hare or a rabbit; and that their ſight is piercing, and their air terrible; that they ſeldom frequent the foreſts, as they require a large ſpace for the diſplay of their wings; they come down to the ſea-ſhore at certain ſeaſons, when their prey fails upon land, they then feed upon dead fiſh, and ſuch nutritious ſubſtances as are thrown upon the ſhore; their countenance not ſo terrible as old writers have repreſented; thoſe who have ſeen this animal, ſay the body is as large as that of a ſheep; many inſtances of its carrying away children; circumſtantial account of this bird by P. Feuillée, the only traveller who has accurately deſcribed it; countries where it is found; in the deſerts of Pachomac, where it is chiefly, men ſeldom venture to travel; its fleſh as diſagreeable as carrion, iii. 88 to 90.

Conepate, an animal reſembling the ſkink in all things except ſize, ii. 243.

Cougar of America, reſembles the tiger in natural ferocity, though far inferior in its dimenſions, iii. 20.

Congelation. See *Blood*, iii. 278.

Congo, the land and ſea breezes there, i. 202; the inhabitants of that country deſire ardently to proſtitute their wives and daughters to ſtrangers for trifling advantages, 270.

Conſtantinople, its cats; name given to the genets, and why, ii. 245.

Continent of America; that part under the line is cool and pleaſant, i. 357.

Coot, deſcription of that bird, iii. 260; reſidence and neſt; ſometimes ſwims down the current, till it reaches the ſea; dangers encountered in this voyage, 261, 262.

Copel, manner of making that veſſel, i. 99.

Copulation, natural inſtinct for the proper times; inſtances of it, i. 413, 414; gnats produce youug, without copulation, iv. 305.

Coquallin, the Braſilian ſquirrel, ſo called by Buffon, ii. 268.

Coral, the common red never met with in the foſſil world, i. 33.

Coral-ſerpent, deſcribed, iv. 148.

Coral-plants, their various appearances; opinion of count Marſigli upon corals; Mr. Ellis proves it the work of reptiles of the polypus kind; principal experiment to this purpoſe, iv. 324, 325.

Coraline, called *fungi modrepores*, iv. 326.

Cordyle, the tockay, and the tejuguacu fill up the chaſm between the crocodile and the African iguana, iv. 112.

Coret, a ſea-ſnail, performs the office of male and female at the ſame time, iv. 49.

Coriander, uſed in dreſſing a hare in the true Roman taſte, ii. 261.

Corin, name of the third variety of gazelles, by Mr. Buffon, ii. 76.

Cormorant, its deſcription and food; remarkably voracious with a ſudden digeſtion; its form diſagreeable; its voice hoarſe and croaking; all its qualities obſcene; no wonder Milton makes Satan perſonate this bird; objection againſt this paſſage of Milton's Paradiſe Loſt vindicated; fiſhes in freſh waters, and in the depth of the ocean; builds in cliffs of rocks, and in trees; preys in the day-time, and by night; once uſed in England for fiſhing, and in what manner; how educated in China, for the purpoſes of fiſhing; the beſt fiſher of all birds; ſometimes has caught the fiſh by the tail; the fins prevent its being ſwallowed in that poſition; how it manages the fiſh in this caſe, iii. 274 to 277; remarked for the quickneſs of its ſight, 279.

Corn, the flying ſquirrel is apt to do a great deal of damage in the corn fields, ii. 273.

Cornaro, lived a hundred years with a conſtitution naturally feeble, i. 339.

Cornea of a flea. See *Flea* and *Flies*, iv. 243, 244.

Cornwall, pilchards make that coaſt a place of reſort, iii. 413.

Coromandel, dreadful tempeſts wholly unknown along its coaſts, i. 200; amazing ſize of oyſters along that coaſt, iv. 60.

Corrira, or the runner, a bird of the crane kind; its deſcription, iii. 252.

Corruption, exceſſive cold preſerve bodies from it; and a great degree of dryneſs produced by heat; earth if drying and aſtringent, produces the ſame effect; bodies never corrupt at Spitzbergen, though buried for thirty years; men and animals buried in the ſands of Arabia, preſerved from corruption for ages, as if actually embalmed; bodies buried in the monaſtery of the Cordeliers at Thoulouſe, preſerved from corruption; bodies previouſly embalmed buried in the ſands of Choroſan, in Perſia, preſerved from corruption for a thouſand years; amazing preſervation from it, in a mummy lately dug up in France, i. 379 to 384.

Coryphæna, the razor-fiſh, its deſcription, iii. 400.

Cotopaxi, volcano in South America, deſcribed by Ulloa, i. 62; more than three geographical miles above the ſurface of the ſea, 91.

Cotton-tree, the ſeed intoxicates parrots, as wine does man, iii. 180.

Cottus, the bull-head; deſcription of this fiſh, iii. 401.

Couando, much leſs than the porcupine, its deſcription; ii. 315.

Cougar, the red tiger, by Mr. Buffon, ii. 170; extremely common in South America; in what manner the Indians encounter it, 171.

Coulterneb, remarkable bird of the Penguin kind. See *Puffin*, iii. 292.

Cows, allured by muſic, i. 322; of ruminant animals, the cow kind deſerves the firſt rank; meaneſt peaſants in Germany, Poland, and Switzerland, kill one cow at leaſt for their own table; ſalted and hung up, is preſerved as a delicacy the year round; cows want the upper fore-teeth; in no part of Europe cows grow ſo large, yield more milk, or more readily fatten than in England; make no particular diſtinction in their herbage, indiſcriminately devouring the proper quantity; it gives back more than it takes from the ſoil; the age of the cow known by the teeth and horns; the number of its teeth; have eight cutting teeth in the lower jaw; manner of renewing them; the horns more ſurely determine this animal's age, and how; while this animal lives, the horns lengthen; wants in udder what it has in neck; the larger the dew lap, the ſmaller the quantity of its milk; the kind to be found in every part of the world; larger in proportion to the richneſs of the paſture; Africa remarkable for the largeſt and ſmalleſt cattle of this kind; as alſo India, Poland, and Switzerland; among the Eluth Tartars, the cow ſo large, that a tall man only can reach the tip of its ſhoulder; of all quadrupeds, the cow moſt liable to alteration from its paſture; the breed of the Iſle of Man, and moſt parts of Scotland, much leſs than in England, alſo differently ſhaped; the breed improved by foreign mixture, adapted to ſupply the imperfections of our own; ſuch as purely Britiſh, far inferior in ſize to thoſe of the Continent; the cow, the urus, and the biſon, animals of the ſame kind; difference in ſize not ſo remarkable as thoſe in its form, hair, and horns; many conſidered as a different kind, and names given them as a diſtinct ſpecies, when in reality all the ſame; only two varieties of the kind really diſtinct, the cow and the buffalo; they bear an antipathy to each other; ſcarce a part of the world where the cow kind is not found; variety of the horns; thoſe in Iceland are without horns; the Barbary cow, or zebu; of all animals, the cow moſt extenſively propagated; an inhabitant of the frozen fields of Iceland, and the burning deſerts of Lybia; other animals preſerve their nature or their form with inflexible perſeverance; the cows ſuit themſelves to the appetites and conveniences of mankind; no animal has a greater variety of kinds, none more humble and pliant; the cow and biſon breed among each other; the cow does not breed with the buffalo; no animals more diſtinct, or have ſtronger antipathies to each other; the cow goes nine months with young; the grunting or Siberian cow and the little African, or zebu, are different races of the biſon; animals of the cow kind, by naturaliſts extended to eight or ten ſorts, reduced to two; an animal of the cow kind, no naturaliſt has deſcribed; the deſcription of it, ii. 40 to 55; the Greeks compared the eyes of a beautiful woman to thoſe of a cow, 76; it eats two hundred and ſeventy-ſix plants, and rejects two hundred and eighteen, 133.

Cow-bezoar, a factitious ſort, ii. 78.

Crab, a ruminating fiſh, ii. 39; ſurpriſing manner in which the monkeys draws crabs from the water, 376; found in freſh and ſalt water, and upon land; deſcription; its inteſtines have many convolutions; land-crabs of various kinds; ſome healthful and nouriſhing; others poiſonous or malignant to a great degree; places where found, iv. 12.

Crab (violet) of the Caribbee iſlands deſcribed; their food; their nippers their principal inſtruments for ſeizing and cutting their food; catch ſuch hold, that the limb is loſt ſooner than the graſp; thus it gets off, leaving its claw faſtened upon the enemy; the claw performs its duty, and keeps a minute faſtened upon the finger, while the crab makes off; it loſes no great matter by a leg or an arm, as they grow again, the animal becomes perfect as before; fatiguing and amazing march from the mountains to the ſea ſhore, to depoſit the ſpawn, from which, ſoon after, millions of little crabs are ſeen ſlowly travelling up the mountains; wait the benefit of ſea-water for their delivery; change their ſhells; have under their ſtomachs four white ſtones, which gradually decreaſe, as the ſhell hardens, and when come to perfection, are not to be found; ſeaſon and manner in which they are caught; in Jamaica they are in great plenty, and conſidered as one of the greateſt delicacies; many of this kind found poiſonous, iv. 12 to 16.

Crab (ſoldier) ſeen every year deſcending from the mountains to the ſea-ſhore, to depoſit its ſpawn, and to provide itſelf with a new ſhell; conteſt between them for ſome well-looking favourite ſhell, for which they are rivals; ſtrike with their claws; beat each other, till the weakeſt is obliged to yield and give up the object of diſpute; when taken, ſends forth a feeble cry, endeavouring to ſeize the enemy with its nippers; not much eſteemed for its fleſh, iv. 17, 18.

Crane, bred familiarly in our marſhes formerly; not now; and why, iii. 52; general characteriſtics and habits of birds of the crane-kind; their food and fleſh; deſcription of the crane; Geſner ſays, its feathers, in his time, were ſet in gold, and worn as ornaments in caps; deſcription of this bird from ancient writers; who have mixed imagination with hiſtory; whence have ariſen the fables of ſupporting their aged parents; and fighting with pigmies; the crane a ſocial bird, and ſeldom ſeen alone; uſual method of flying or ſitting, in flocks of fifty or ſixty together; while part feed, the reſt keep guard; ſubſiſts moſtly upon vegetables; are known in every country of Europe, except our own; are birds of paſſage; ſeaſons of their migrations, during which they do incredible damage, chiefly in the night; were formerly known, and held in great eſtimation here for the delicacy of their fleſh; there was a penalty upon deſtroying their eggs; Plutarch ſays, cranes were blinded, kept in coops, and fattened for the tables of the great in Rome; at preſent, they are conſidered all over Europe as wretched eating; qualities of its fleſh; their note the loudeſt of all other birds; and often heard in the clouds, when the bird itſelf is unſeen; amazing heights to which they aſcend when they fly; though unſeen themſelves, they have diſtinct viſion of every object below; extraordinary length and contortion of its windpipe; uſe made of their clangorous ſound; they riſe but heavily, are ſhy birds, and ſeldom let the fowler approach them; their depredations uſually in the darkeſt nights; when they enter a field of corn, and trample it down, as if croſſed over by a regiment of ſoldiers; corn their favourite food, ſcarce any other comes amiſs to them; Redi's experiments to this purpoſe; a little falcon purſues, and often diſables it; method uſed on ſuch occaſions by thoſe fond of hawking; barbarous cuſtom of breeding up cranes to be thus baited; eaſily tamed; Albertus Magnus ſays, it has a particular affection for man; the female diſtinguiſhed from the male, by not being bald behind; never lays above two eggs at a time; the young are ſoon fit to fly; and unfledged, they run with ſuch ſwiftneſs that a man cannot eaſily overtake them; Aldrovandus aſſures us one was kept tame for above forty years; the vulgar bear the crane a compaſſionate regard; prejudices in its favour; a heinous offence in ſome countries to kill a crane; diſtinctions between the crane and the ſtork, 223 to 231.

Crane, the *Balearic*, from the coaſt of Africa, and the Cape de Verd iſlands, its deſcription; habits; has been deſcribed by the name of the ſea peacock; real Balearic crane of Pliny; foreign birds of the crane-kind, deſcribed; the jabiru, the jabiru-guacu; the anhima; the buffoon bird, or Numidian crane, deſcribed, iii. 233 to 236; place where the crane kind ſeem to have formed their general rendezvous, 246; the flamingo the moſt remarkable of all the kind, the talleſt, bulkieſt, and moſt beautiful, deſcribed; ſmall birds of the crane kind, 253.

Crantz. See *Krantz*, i. 143, 144.

Crœſus (king of Lydia) ſeated on his throne with all the barbarous pomp of Eaſtern ſplendour, aſking Solon if he had ever beheld any thing ſo fine? was anſwered, that after the beautiful plumage of the pheaſant, he could be aſtoniſhed at no other finery, iii. 131.

Cricetus, the *German rat*, by Mr. Buffon called the hamſter, its deſcription;

is the greateſt peſt in the countries were found, and every method made uſe of to deſtroy it; its hole a curious object for contemplation; ſhews a ſkill ſuperior to the reſt of the rat kind; deſcription of it; their ſtorehouſes; contain two buſhels of good grain in each apartment; means of finding out their retreats; produce young twice or thrice a year, and bring five or ſix at a time; their devaſtations produce a famine; they deſtroy each other; their fur very valuable, ii. 297 to 299.

Cricket, a ruminating inſect, or ſeemingly ſo, ii. 39; difference from the graſshopper; their voice; food, iv. 216; never drink; ſound of drums and trumpets make them forſake their ſituation, 217.

Cricket, (mole) deſcribed, thought to be amphibious, iv. 217; the number of their eggs; a moſt deteſted inſect by gardeners; its devaſtations; precautions of the female againſt the black beetle; their care and aſſiduity in the preſervation of their young, 218.

Croches, in the head of the ſtag, ii. 98.

Crocodile, extraordinary combat between this animal and the tiger, ii. 172; the ichneumon diſcovers and deſtroys its eggs; kills its young, and ſometimes entering the mouth of the crocodile, when ſleeping on the ſhore, effectually deſtroys it, ii. 241; the eggs it lays in the ſand, often amount to three or four hundred, 242; the places where found together with their dimenſions; deſcription; ſeveral examples of taking a man out of a canoe from his companions, notwithſtanding all oppoſition and aſſiſtance; terrible even upon land; its depredations; combats between the crocodile and the tiger; in what manner it ſeizes its prey; how a negro ventures to attack this animal in its own element; manner of taking it at Siam; often managed like a horſe; a curb put into its mouth, and the rider directs it as he likes; manner of taking it along the rivers of Africa; pools of water where bred as we breed carp in our ponds; in Egypt and other long peopled countries, this animal ſolitary and fearful; in the river San Domingo, they are moſt inoffenſive, children play with them, and ride about on their backs; beat them without receiving the ſmalleſt injury; probable opinion, its muſky ſubſtance amaſſed in glands under the legs and arms; its fleſh; the eggs to the ſavages moſt delicate morſels; all breed near freſh waters; precautions in laying their eggs; the female having introduced her young to their natural element, ſhe, and the male, become their moſt formidable enemies; the open bellied crocodile, thought viviparous, has a falſe belly like the opoſſum, for the young to creep out and in, as danger or neceſſity requires; their age; produced to fight at the amphitheatre at Rome, iv. 95 to 106.

Croppers, a kind of pigeons, iii. 186.

Croſsbill, a bird of the ſparrow kind, iii. 197.

Croſt fox, animal between the dog and fox, ii. 220. See *Iſatis*.

Crown, in the head of a ſtag, ii. 98.

Crows, fetch and carry with the docility of a ſpaniel, iii. 149; the *carrion-crow* reſembles the raven in appetites, laying, and manner of bring up its young; the *Royſton crow*, 353.

Cruelty, teaching the arts of cruelty, equivalent to committing them, iii. 121.

Cruſtaceous, animals of the lobſter kind, iv. 7.

Cub, the fox is ſo called during the firſt year, ii. 214; born blind, like thoſe of the dog, 216.

Cuckoo, fables invented of this bird now ſufficiently refuted; where it reſides in winter, or how provides for its ſupply during that ſeaſon, ſtill undiſcovered; this bird ſomewhat leſs than a pigeon, ſhaped like a magpie, and of a greyiſh colour, is diſtinguiſhed from all other by its round prominent noſtrils; diſcovers itſelf in our country early in the ſpring, by its well-known call; its note heard earlier or later as the ſeaſon is more or leſs forward, and the weather inviting; from the cheerful voice of this bird the farmer inſtructed in the real advancement of the year; hiſtory and nature of this bird ſtill in great obſcurity; its call an invitation to courtſhip, uſed only by the male, generally perched upon a dead tree, or bare bough, repeating his ſong, which he loſes when the genial ſeaſon is over; his note pleaſant though uniform; the female makes no neſt; repairs to the neſt of ſome other bird, generally the water wagtail or hedge-ſparrow, and after devouring the eggs of the owner, lays hers in their place; uſually lays but one, and this the little fooliſh bird hatches with great aſſiduity, and, when excluded, fondly thinks the ill-looking changeling her own; to ſupply this voracious creature, the credulous nurſe toils with unwearied labour, not ſenſible ſhe is feeding up an enemy to her race; the ſtomach of this bird is enormous, and reaches from the breaſt-bone to the vent; its food; naturally weak and fearful; the ſmaller birds form a train of purſuers; the wry-neck, in particular, the moſt active in the chaſe; ſuppoſed, in winter, to lie hid in hollow trees, or to paſs into warmer climates; ſtory of a cuckoo found in a willow log, in winter; probable opinion concerning its reſidence in winter; Briſſon makes not leſs than twenty-eight ſorts of this bird; and talks of one of Braſil, as making a horrible noiſe in the foreſts, iii. 170 to 173; follows a very different trade from what its nurſe endeavoured to teach it; and, according to Pliny, in time deſtroys its inſtructor, 306 to 307.

Cuckow-ſpit, or froth-worm, its deſcription, iv. 220.

Cud, the hare, the rabbit, and the ſquirrel, placed by Pyerius among thoſe that chew the cud; how far true is not determined, ii. 255.

Cuguacu apara, name in Braſil for the roe-buck, ii. 112.

Cummin ſeed, formerly uſed in dreſſing a hare in true Roman taſte, ii. 261.

Cur, the cur-fox, ii. 217.

Curiſchaff, a lake where the ſturgeon is found in greateſt numbers, iii. 253.

Curlew, a ſmall bird of the crane kind; its dimenſions; places where found; manner of procuring its food; its habits; its neſt, and number of eggs; a bird of paſſage; ſeaſon of courtſhip, 253 to 258.

Currants, indigeſtible to man, when ſwallowed whole, iii 74.

Currents of rivers well explained by the Italians, i. 118; ſide current; back current, 120; ſometimes the current at bottom ſwifter than at top, and when; double current, 121; found to run in all directions; manner in which mariners judge of the ſetting and rapidity of the current; currents are generally found moſt violent under the equator; a paſſage with the current gone in two days, with difficulty performed in ſix weeks againſt it; currents do not extend above twenty leagues from the coaſt; the currents at Sumatra extremely rapid, run from ſouth to north; alſo ſtrong currents between Madagaſcar and the Cape of Good Hope; but the moſt remarkable are thoſe continually flowing into the Mediterranean ſea; current runs one way at top, and the ebb another way at bottom, i. 152 to 154.

Current of air, driven through a contracted ſpace, grows more violent and irreſiſtible, i. 204.

Cuſco, Garcilaſſo de la Vega aſſerts the air is ſo dry and ſo cold there, that fleſh dries like wood, without corrupting, i. 379.

Cuſtom, the form of the face ſeems rather the reſult of cuſtom, i. 360.

Cuttle-fiſh, its deſcription; contrivance with which it is furniſhed by Nature, when under a difficulty of eſcaping, iv. 315, 316.

Cybotus a lofty mountain ſwallowed by an earthquake, i. 97.

Cynocephalus, the magot of Buffon, the laſt of the ape kind; its deſcription; is a native of Africa and the Eaſt, ii. 365.

Cyprinus, or the carp, iii. 404. See *Carp*.

Czar of Ruſſia. See *Peter*.

D

Dam, in the rapacious kinds, leads her young forth for months together; it is not ſo with thoſe of the hare kind, ii. 256.

Dampier, has added more to natural hiſtory than half the philoſophers before him, iv. 28.

Damps, of various natures in mines; the fulminating ſort, i. 51, 52.

Dance, hares taught to dance to muſic, ii. 258.

Dancer, a dog of the mongrel kind, ii. 194.

Dane, the talleſt dog bred in England, ii. 192 to 194.

Danube, has ſeven openings into the Euxine Sea, i. 80; proceeds from the Alps, 85; its courſe; the Turks and Chriſtians have fleets of men of war upon it, 123; it receives thirty leſſer rivers, 127; the huſo, or iſinglaſs fiſh, caught in great quantities in this river, iii. 387.

Dara, its inhabitants uſe oſtriches as horſes, iii. 68.

Darien, an iſthmus; has a particular hog called waree; deſcribed by Wafer, ii. 144.

Darkneſs, ſurpriſing how far the eye accomodates itſelf to it, i. 317; remarkable inſtance of it in a gentleman, a major under Charles the Firſt, 318.

Daubenton, gives a complete hiſtory of a dwarf, i. 368.

Deaf men, often found to ſee the force of thoſe reaſonings which they could not hear, underſtanding every word as it was ſpoken, i. 279; one born deaf, muſt neceſſarily be dumb; inſtances of two young men, who, born deaf, were reſtored to hearing, 325; a perſon born deaf, by time and pains, taught to write, read, ſpeak, and by the motion of the lips, to underſtand what is ſaid; inſtances of it, 326.

Deafneſs, one of the moſt common diſorders in old age; way to know this defect either internal or external, i. 324.

Death, a young man born deaf and dumb, knew nothing of death, and never thought of it till the age of twenty-four, when he began to ſpeak of a ſudden, i. 326; a ſpectre, which frights us at a diſtance, but diſappears when we come to approach it, 343; uncertainty of the ſigns of death, 344.

Deer, annually ſhedding horns, and their permanence in the ſheep, draws a diſtinct line between their kinds, ii. 56; the little Guinea deer, the leaſt of all cloven-footed quadrupeds, and moſt beautiful; its deſcription, 81; the male in Guinea has horns, but the female is without; they abound in Java and Ceylon, 82; all of the deer kind want the gall-bladder, 87; a downy ſubſtance like velvet upon the ſkin covering the ſkull of a deer, when the old horn is fallen off; their horns grow differently from thoſe of ſheep or cows; they are furrowed along the ſides, and why, 89; the bran deer, or the brown deer, called by the ancients tragelaphus, found in the foreſts of Germany; the new continent of America produces animals of the deer kind in ſufficient plenty, 103.

Deer (Fallow), no animals more nearly allied than the ſtag and fallow deer, yet they never herd nor engender together, nor form a mixed breed; each form diſtinct families, and retain an unalterable averſion; the fallow deer rarely wild in the foreſts; are in general bred in parks, and their fleſh is preferred to that of any other animal; a herd of them divides into two parties, and engages each other with great ardour and obſtinacy; both deſirous of gaining a favourite ſpot of the park for paſture, and of driving the vanquiſhed into the more diſagreeable parts; manner of their combats; are eaſily tamed; and browze cloſer than the ſtag; they ſeek the female at their ſecond year; their ſtrength, cunning, and courage inferior to thoſe of the ſtag; we have in England two varieties of the fallow deer; one brought from Bengal, the other from Norway; fleſh of the French fallow-deer, has not the fatneſs or the flavour of that fed upon Engliſh paſture; Spaniſh and Virginian fallow-deer; deer without horns, their deſcription, ii. 104 to 107.

Deer (Rein), the moſt extraordinary and moſt uſeful; native of the icy regions of the North; it anſwers the purpoſes of a horſe; attempts made to accuſtom it to a more ſouthern climate, in a few months it declines and dies; anſwers the purpoſes of a cow in giving milk, and of the ſheep in furniſhing warm clothing to the people of Lapland and Greenland; deſcription of the rein-deer; its rutting time, and that of ſhedding its horns; difference between this deer and the ſtag; it is not known to the natives of Siberia; Americans call it caribou; herdſmen of Lapland known to poſſeſs a thouſand rein-deer in a ſingle herd; it ſubſiſts upon moſs; and makes the riches of the people of Lapland; gnats and gadflies very formidable to this deer in Lapland; female brings forth in May; its milk thinner than that of the cow; ſweeter and more nouriſhing; is of two kinds in Lapland; it draws ſledges; can go about thirty miles without halting, and without dangerous effort; generally caſtrated by the Laplanders ; one male left for ſix females ; begin to breed when two years old ; go with young eight months, and bring two at a time ; fondneſs of the dam remarkable ; live but fifteen or ſixteen years ; manner in which the Laplanders kill them ; ſcarce any part of this animal not converted to peculiar uſes ; the Laplanders find their neceſſities ſupplied from the rein-deer alone ; in what manner ; diſeaſes of this animal ; the blood of the rein-deer preſerved in ſmall caſks, for ſauce with the marrow in ſpring ; the horns converted into glue ; the ſinews make the ſtrongeſt ſewing-thread ; the tongues a great delicacy ; the inteſtines waſhed like our tripe in high eſteem among the Laplanders ; bears make depredations upon the rein-deer ; glutton its moſt dangerous and ſucceſsful perſecutor ; only method of eſcape from this creature, 117 to 129 ; in what manner the rein-deer is killed by it, 230 ; the wolf never attacks a rein-deer that is haltered in Lapland, and why, 211.

Deformity, children often inherit even the accidental deformities of their parents ; inſtances of it ; accidental deformities become natural ; by aſſiduity continued and increaſed, through ſucceſſive generations, i. 360 ; all thoſe changes the African, the Aſiatic, or the American undergo in their colour, are accidental deformities, probably to be removed, 362.

Demoiſelle, name given by the French to the Numidian bird, ii. 236.

Denmark. See *Henry IV.*

Depona, a large ſerpent, native of Mexico, iv. 154.

Derbent, paſtures in theſe plains excellent for rearing horſes, ii. 16.

Derbyſhire, deſcription of the neſt of an eagle found in the Peak of Derbyſhire, iii. 84.

Derham, by a microſcope, diſcovered in the eye of a mole, the parts known in other animals, ii. 303.

Deſman, one of the three diſtinctions of the muſk-rat ; a native of Lapland, ii. 296.

Devil, the Swediſh Laplanders conſult him, i. 347.

Devil (Sea), or fiſhing-frog deſcribed, iii. 386.

Dew, compenſates the want of ſhowers in Egypt, i. 206.

Dewlap. See *Zebra*, ii. 35. See *Cow*, ii. 44.

Diableret, a mountain in France ſuddenly fallen down ; its ruins covered an extent of a league ſquare, i. 94.

Dictionaries of Arts and Sciences, a fault that has infected moſt of them, i. 397.

Diet of a thin ſparing kind remarkable among quadrupeds, as well as the human ſpecies, to produce hair, iii. 229.

Digeſter, an inſtrument ; meat and bones put into it, diſſolved into a jelly in ſix or eight minutes, i. 178.

Digeſtion, theſe organs in birds are in a manner reverſed, iii. 43 ; is not perfect in all birds that live upon mice, lizards, or ſuch like food, 110 ; performed by ſome unknown principle in the ſtomach, acting in a manner different from all kinds of artificial maceration ; this animal power lodged in the maw of fiſhes, iii. 326, 327.

Diſeaſes, of the rein-deer ; the manner in which the Laplanders cure them, ii. 128.

Diſorders, infectious, propagated by the effluvia, from diſeaſed bodies, i. 189 ; moſt of thoſe incident to mankind, ſays Bacon, ariſe from the changes of the atmoſphere, iii. 331 ; fiſhes have their diſorders, 421.

Diver (the great northern), a bird of the ſmaller tribe of the penguin kind ; the grey ſpeckled diver ; the ſcarlet-throated diver, iii. 292.

Divers, known to deſcend from twenty to thirty fathom, i. 167 ; of all thoſe who have brought information from the bottom of the deep, Nicola Peſce the moſt celebrated ; account of his performances by Kircher, 170 ; ſome known to continue three quarters of an hour under water, without breathing ; they uſually die conſumptive ; manner of fiſhing for pearls, iv. 64.

Dodo, its deſcription, iii. 75 ; among birds, as the ſloth among quadrupeds, an unreſiſting animal, equally incapable of flight or defence ; native of the Iſle of France ; the Dutch firſt diſcovered and called it the nauſeous bird ;

travellers deem its fleſh good and wholeſome; it is eaſily taken; three or four dodos enough to dine a hundred men; whether the dodo be the ſame bird with that deſcribed under the name of the bird of Nazareth, remains uncertain, 76.

Doe, the female of the deer kind, ii. 106.

Dogs, always running with their noſes to the ground, ſuppoſed of old the firſt that felt infection, i. 184; no other animal of the carnivorous kind will make a voluntary attack, but with the odds on their ſide, 403; the Arabian horſes outrun them, ii. 9; in the dog kind the chief power lies in the under jaw, 146; in Syria, remarkable for the fine gloſſy length and ſoftneſs of their hair, 153; in tropical climates, loſe the delicacy of their ſcent, and why; the lion, tiger, panther, and ounce, all natural enemies to the dog, 179; dog kind not ſo ſolitary as thoſe of the cat; their proper prey are animals unfitted for climbing; they can live for ſome time upon fruits and vegetables, 184; deſcription of the dog; knows a beggar by his clothes, by his voice, or his geſtures, and forbids his approach, 185; the dog moſt ſuſceptible of change in its form, 187; all dogs are of one kind, which the original of all the reſt, which the ſavage dog, whence ſuch a variety of deſcendants, is no eaſy matter to determine; the ſhepherd's the primitive animal of his kind; thoſe wild in America and Congo, as thoſe of Siberia, Lapland, Iceland, of the Cape of Good Hope, of Madagaſcar, Madura, Calicut, and Malabar, reſemble the ſhepherd's dog; thoſe in Guinea, at the ſecond or third generation forget to bark; dogs of Albany, of Greece, of Denmark, and of Ireland, larger and ſtronger than any other; ſhepherd's dog, tranſported into temperate climates, and among people entirely civilized, from influence of climate and food alone, becomes a matin, a maſtiff, or a hound; *Turkiſh dog*; *great Daniſh dog*; *great wolf dog*, or *Iriſh wolf dog*; the *little Daniſh dog*; their variety now in England, much greater than in the times of queen Elizabeth; Dr. Caius divides the whole race into three kinds; the generous, the farm kind, the mongrel, 187 to 192; three ſhepherd's dogs reckoned a match for a bear, and four for a lion; three of them overcame a lion in the time of king James the Firſt; the famous poet Lord Surry, the firſt who taught dogs to ſet; the *pug dog*; the Engliſh *bull dog*; the *lion dog*, originally from Malta; its deſcription; the *Moloſſian dogs* of the ancients, according to Mr. Buffon; *Epirotic dogs*, mentioned by Pliny; *Indian dogs*, mentioned by Ælian; his deſcription of a combat between a dog and a lion; the braveſt of the kind; the nobler kinds of dogs, of which ſuch beautiful ancient deſcriptions, now utterly unknown, 194 to 197; puppies' eyes not open till ten or twelve days old; dog's teeth amount to forty-two; this animal capable of reproducing at the age of twelve months; goes nine weeks with young, and lives about twelve years; other particulars concerning dogs; many kinds of birds the dogs will not touch; dogs and vultures living wild about Grand Cairo in Egypt, continue together in an amicable manner, and are known to bring up their young in the ſame neſt; dogs bear hunger for a long time; a bitch forgotten in a country-houſe, lived forty days without any other ſuſtenance than the wool of a quilt ſhe had torn in pieces, 200 to 202; the wild hunt in packs; unknown, ſuch as he was before the protection of man; ſome from a domeſtic ſtate, have turned ſavage, and partaken of the diſpoſition of the wolf, and attack the moſt formidable animals of the foreſt; are eaſily tamed, and quickly become familiar and ſubmiſſive, 186, 187; experiments to prove the wolf and the fox not of the ſame nature with the dog, but of a nature perfectly diſtinct; animals in this country bred between a dog and a fox; a dog ſet at liberty, in his ſavage fury flew upon every animal, fowls, dogs, and men, 199, 200; the dog and the wolf ſo much alike internally, that anatomiſts can ſcarce perceive the difference, 202; a young dog ſhudders at the ſight of a wolf; dogs and wolves ſo different in their diſpoſitions, that no animals have a more perfect antipathy, 204; by inſtinct, without education, dogs take care of flocks and herds, 205; ſhew no appetite to enjoy their victory when the wolf is killed, but leaves him where he falls, 209; Cateſby aſſerts the wolf was the only dog uſed by the Americans, before the Europeans came among them, and they have ſince procreated together; thus proving the dog and the wolf of the ſame ſpecies; unſurmountable antipathy between the dog and the jackal; they never part without an engagement, 220; famiſhed dogs more hairy than thoſe whoſe food has been more plentiful, 229; all kinds purſue the hare by inſtinct and follow it more eagerly than other animals, 256; few dogs dare to encounter the otter; ſome purpoſely trained for diſcovering the retreat of the otter, 336.

Dog butchers all over China, and ſhambles for ſelling their fleſh; wherever a dog butcher appears, all the dogs of the place are in full cry after him; along the coaſts of Guinea, their fleſh is eſteemed a delicacy by the Negroes; they give a cow for a dog, ii. 198.

Dolphin caught in the Red Sea, known by a ring to be the ſame taken before in the Mediterranean, i. 153; allured by muſic, 322; not eaſy to aſſign a cauſe why the ancients have invented ſo many fables on the ſubject; their boundings in the water, have taught mariners to prepare for a ſtorm; old painters and ſculptors have drawn them wrong; the poets have adopted the error; Pliny has aſſerted, they inſtantly die when taken out of the water; Rondelet aſſures us, he has ſeen a dolphin carried alive from Montpellier to Lyons; their motions the gambols of pleaſure, or the agitations of terror, not well known; in fair weather they herd together, and purſue ſhoals of various fiſh with impetuoſity, iii. 357.

Dolphin, is alſo the name of the ophidium, or the gilt-head, iii. 399.

Don, or *Tanais*, a river, its courſe, i. 123; the ſturgeon is caught in great quantities at the mouth of that river, iii. 385.

Dorado, ſuppoſed a ruminating fiſh, ii. 39; a fiſh of the ſpinous kind, the moſt voracious; its deſcription; the flying-fiſh is chiefly ſought by it; warfare carried on between them, iii. 418.

Doree, deſcription of this fiſh, iii. 401.

Dormouſe, the mercury of the thermometer plunged into the body of a living dormouſe never roſe beyond its pitch in air, and ſometimes ſunk above a degree, ii. 278, the greater ſort Mr. Buffon calls the *loir*, the middle ſize he calls the *lerot*, and the leſs he denominates the *muſcardin*; their deſcriptions; agree in being ſtupified like the marmout during winter; their neſt and proviſions; they bring forth three or four young at a time, but once a year, in ſpring, 295.

Dor-beetle, or *May-bug*, iv. 292. See *Beetle*.

Dottrel, ſmall bird of the crane kind, iii. 253.

Doves, the *ſtock-dove*, iii. 182; the *turtle-dove*, 185; the *ring-dove*, 186. See *Pigeon*.

Douc, a monkey of the ancient continent, ſo called in Cochinchina, where it is a native; its deſcription; forms part of the chain by which the monkeys of one continent are linked with thoſe of the other, ii. 380.

Draco volans, a flying ball of fire, i. 218.

Drag, name given by the huntſmen to the tail of the fox, ii. 215.

Dragons, the whole race dwindled down to the flying lizard, iv. 115.

Dragon-fly, or the *libella*, deſcribed, iv. 198.

Dragonet, deſcription of this fiſh, iii. 399.

Dreſs, the firſt impreſſion generally made, ariſes from dreſs, i. 284.

Drill, of Purchas, an ape of the kind of the ouran outang, ii. 355.

Dromedary, a ſort of camel, iii. 5.

Drone, a ruminating inſect, or ſeemingly ſo, ii. 39.

Drones, the ſecond ſort of bees, ſuppoſed to be the males, iv. 258; their cells, 262; the working-bees kill the drones in the worm ſtate, in the cell, and eject them from the hive, among the general carnage, 269.

Drugs, in the tropical climates loſe their virtue, and become verminous, i. 182.

Drum, among the Swediſh Laplanders every family has one for conſulting the devil, i. 347; hares taught to beat the drum, ii. 258.

Dryneſs, a great degree of it produced by heat, preſerves from corruption, i. 379.

Duck, when ducks are caught, the men keep a piece of turf burning near their mouths, and breathe upon it, leſt the fowl ſmelling them ſhould eſcape, iii. 41; of the numerous tribes of the duck kind, no more than five breed here, 53; Plutarch aſſures us, Cato kept his family in health, feeding them with duck, whenever they threatened to be out of order, 299; its eggs often laid under a hen; ſeems a heedleſs inattentive mother; of the tame duck, ten different ſorts; and of the wild, Briſſon reckons above twenty; the moſt obvious diſtinction between the wild and tame ducks; difference between wild ducks among each other; ſea, and pond ducks; names of the moſt common birds of the duck kind, among ourſelves, and of the moſt noted of the foreign tribe; their habits, neſts, and number of eggs; are in general, birds of paſſage; their fleſh; the ducks flying in the air, often lured down from their heights by the loud voice of the mallard from below; what part of the lake they generally chooſe; what can employ them all day, not eaſy to gueſs; manner of making and managing a decoy to take them; the American wood-duck, 307 to 311; general ſeaſon for catching them in decoys, from the end of October till February; taking them earlier prohibited by an act of George the Second, impoſing a penalty of five ſhillings for every bird deſtroyed at any other ſeaſon; amazing quantity of ducks ſent to ſupply the markets of London; manner of taking them frequently practiſed in China, 313.

Dumb. See *Deaf*, i. 325.

Dung, ſome animals void it when purſued; this ariſes rather from fear than a deſire of defence, ii. 54.

Dunlin, a ſmall bird of the crane kind, iii. 253.

Dutch, ſolicitous about the preſervation of the ſtork, in every part of their republic, iii. 232.

Dwarf, in England, as late as the time of king James the Firſt, the court was furniſhed with one; and he was called Little Jeffery; Peter of Ruſſia celebrated a marriage of dwarfs, i. 366, 367; they ſeem to have faculties reſembling thoſe of children; hiſtory of a dwarf accurately related by Mr. Daubenton, 368.

Dwina, a river; its courſe and ſource, i. 123.

E

Eagle kind, the flap of an eagle's wing known to lay a man dead in an inſtant, 39; it flies at the buſtard or the pheaſant, 78; diſtinctive marks from the other kinds of carnivorous birds; the golden eagle is the largeſt and nobleſt of all thoſe birds deſigned by the name of eagle; its deſcription; conſidered among birds, as the lion among quadrupeds; ſtrong ſimilitude to each other; great patience, and much art, required to tame an eagle; though taken young, and brought under by long aſſiduity; yet it is a dangerous domeſtic, and often turns its force againſt its maſter; ſometimes has an attachment for its feeder; it is then ſerviceable and will provide for his pleaſure and ſupport; flies the higheſt of all birds, and from thence has by the ancients been called the bird of heaven; it has alſo the quickeſt eye; but its ſenſe of ſmelling is far inferior to that of the vulture; it never purſues, but in ſight; finds difficulty in riſing when down; carries away geeſe, cranes, hares, lambs, and kids, and often deſtroys fawns and calves, to drink their blood, and carries a part of their fleſh to its retreats; infants, when left unattended, have been deſtroyed by theſe rapacious creatures; the eagle is peculiarly formidable when bringing up its young; a poor man got a comfortable ſubſiſtence for his family, during a ſummer of famine, out of an eagle's neſt, by robbing the eaglets of food; eagles killed a peaſant who had robbed their neſts; there is a law in the Orkney iſlands, which entitles any perſon that kills an eagle to a hen out of every houſe in the pariſh, in which the plunderer is killed; the neſt of the eagle is uſually built in the moſt inacceſſible cliff of the rock; deſcription of one found in the Peak of Derbyſhire; it hatches its eggs for thirty days; very rare to find three eaglets in the ſame neſt; and it is aſſerted, that the mother kills the moſt feeble, or the moſt voracious; it is believed they live about an hundred years, and that they die, not of old age, but from the beaks turning inward upon the under jaw, and preventing their taking any food; an eagle endured hunger for twenty-one days, without any ſuſtenance whatever;

they are firſt white, then inclining to yellow, and at laſt light brown; age, hunger, captivity, and diſeaſes, make them whiter; thoſe kept tame are fed with every kind of fleſh; freſh or corrupting; and upon a deficiency of that, bread, or any other proviſion, will ſuffice; it is dangerous approaching them, if not quite tame, and they ſometimes ſend forth a loud piercing lamentable cry, which renders them ſtill more formidable; they drink but ſeldom, and perhaps when at liberty, not at all; the bald eagle an inhabitant of North Carolina; breeds in that country all the year round; manner in which the eggs are hatched; characteriſtics and habitudes of this animal; its neſt is large enough to the fill the body of a cart, and commonly full of bones half eaten, and putrid fleſh, the ſtench of which is intolerable, 80 to 86.

Eagle, the *ſea-eagle* called *aquila piombina* by the Italians; they often lay three or four eggs, of a leſs ſize than thoſe of a hen, of a white elliptical from; diſtinctive marks of the *golden eagle*, of the *common eagle*, of the *bald eagle*, of the *white eagle*, iii. 86; of the *rough-footed eagle*, of the *white-tailed eagle*, of the *erne*, of the *black eagle*, of the *ſea-eagle*, of the *oſprey*, of the *jean le blanc*, of the *Braſil eagle*, of the *Oroonoko eagle*, of the *crowned African eagle*, of the *eagle*, of *Pondicherry*, 87.

Ears, diſtinguiſhing features in quadrupeds; ſerve in them as principal marks of the paſſions; ſmalleſt ears in men ſaid to be moſt beautiful; the largeſt the beſt for hearing; ſome ſavage nations bore their ears, and draw that part down, till the tip of the ear reſts upon the ſhoulder, i. 282; "the richeſt jewels in an Æthiop's ear," a proverb, 283; undulations, which ſtrike the ear, ſuppoſed but one continued ſound, by their quick ſucceſſions, though in reality they make many, 319; perſons hear differently with one ear from the other; theſe have what muſicians call a bad ear; and as hearing falſe, alſo ſing falſe; ſuch perſons alſo deceived as to the ſide whence the ſound comes, 325; from what cauſe the long ears of the Tartars and Chineſe, 360; thoſe of the hare moveables and capable of direction to every quarter, ii. 255; are remarkable good, 258; birds have not the external ear ſtanding out from the head; probably the feathers encompaſſing the ear-holes, ſupply the defect of the exterior ear, iii. 40.

Earth, its globe a million of times leſs than the ſun, i. 10; placed at a happy diſtance from the centre, in our ſolar ſyſtem; leſs diſtant from the ſun than Saturn, Jupiter, and Mars, and leſs parched up than Venus and Mercury, ſituated too near the violence of its power; the earth, like a chariot-wheel, has a compound motion, its rotundity proved, 13; is rather flatted at the poles, and its form reſembles that of a turnip, 14; conſidered as one ſcene of extenſive deſolation, 20; ſuppoſed by Buffon a globe of glaſs; by Whiſton a ſphere of heated iron; by Kircher one dreadful volcano; by Burnet a great maſs of water; compoſed of different layers or beds, lying horizontally one over the other, like the leaves of a book, 36.

Earth (garden), or mound-earth, a kind of mother, never found an enemy to man, 36; black earth formed by decayed leaves and branches in Burgundy, 38; drying and aſtringent earth preſerves bodies from corruption, 380; all ſuch earths as ferment with vinegar, are a compoſition of ſhells, decayed, and crumbled down to one uniform maſs, iv. 39.

Earthquakes, frequent through the whole region, where a volcano is ſituated, i. 56; various kinds of them diſtinguiſhed by philoſophers; and by Mr. Buffon; air the only active operator in them; ſeveral opinions upon the cauſe of them; activity of internal heat alone ſufficient to account for every appearance attending earthquakes; twelve cities in Aſia Minor ſwallowed up in one night; extraordinary earthquake related by Pliny; account of that in the year 1695, extending to a circumference of two thouſand ſix hundred leagues; minute deſcription of that in Jamaica in 1792, 65 to 69; account of the dreadful ſhock in Calabria in 1638, 71, concomitant circumſtances attending earthquakes, 74.

Earth-worm of America often a yard in length, and as thick as a walking tane, i. 233; multiplied by being cut in pieces, i. 242; its deſcription, iv. 310. See *Worms*.

Ear-wig, its habits; reproaches groundleſs about this animal; its food, iv. 219; general characteriſtics of the kind; lives in its winged ſtate a few days; dies to all appearance conſumptive, 220.

Eaſt Indies, favourable months of embarking for them, i. 199.

Echeneis, the ſucking fiſh; its deſcription, iii. 403.

Echini, or urchins, a multivalve ſhell-fiſh, iv. 65. See *Urchins*.

Echo, no art can make an echo, i. 324.

Edgar, king of England, the firſt who attempted to rid this kingdom of wolves, and in what manner, ii. 210.

Edward I. iſſued his mandate to Peter Corbet to ſuperintend, and aſſiſt in the deſtruction of wolves, ii. 210.

Edward III. made it felony to ſteal a hawk, iii. 97.

Edward IV. his act concerning ſwans, iii. 303.

Eel, deſcribed, iii. 402.

Effluvia, from diſeaſed bodies propagate diſorders called infectious, i. 189.

Egg, all birds, moſt fiſhes, and many of the inſect tribes, brought forth from eggs; warmth of the ſun, or of a ſtove, efficacious in bringing the animal in the eg to perfection; its deſcription; hiſtory of the chicken in the egg to its complete formation, i. 244 to 249; quadrupeds brought forth from the egg, above two hundred at a time, 414; the ichneumon diſcovers and deſtroys the eggs of the crocodile, ii. 241; the crocodile lays in the ſand at a time three or four hundred, 242; ſome eggs only addled by incubation, iii. 47; ſuch birds as undiſturbed lay but two or three eggs; when their eggs are ſtolen, lay ten or twelve; a common hen, moderately fed, lays above a hundred from the beginning of ſpring, to the latter end of autumn, 51; ſome of the oſtrich's weigh above fifteen pounds, 65; Galen thought the eggs of hens and pheaſants good to be eaten; thoſe of geeſe and oſtriches are the worſt of all, 68; and thoſe hatched in the hot ſand, where laid, 70; taking the eggs of a hawk, puniſhed with impriſonment, and a fine, at the king's pleaſure, in the reign of Edward III. 97; inhabitants of Norway prepare from the eggs of the porpeſſe a kind of caviar, or delicate ſauce, and good when eaten with bread, 359; manner in which the eggs of fiſhes are impregnated, wholly unknown, 415; doubts whether fiſh come from the egg completely formed, 416; thoſe of the turtle hatched by the ſun, iv. 31.

Eggs, (Sea) name given in our cabinets to a multivalve ſhell-fiſh called echini, or urchins, by naturaliſts, iv. 65; thoſe of the ſea urchin a great delicacy, 67; opening the body of a queen bee, there appeared in it five thouſand eggs, 264.

Eglantine, found at a well dug at Marly, i. 39.

Egypt, has fouth winds ſo hot during ſummer, that reſpiration is almoſt ſtopped by them; they are charged with ſuch quantities of ſand, that they darken the air, as with a cloud; it rains very ſeldom in that country; but the want of ſhowers is compenſated by the copiouſneſs of their dews, i. 206; the catacombs, 381; a mummy, not long ſince dug up in France, ſhews the art of embalming was more completely underſtood in the weſtern world, than in Egypt itſelf, 383, 384; the Tingitanians and Egyptians have now the fame of rearing the fineſt horſes, both for ſize and beauty, ii. 13; the ichneumon uſed in this kingdom, for the ſame purpoſes that cats are in Europe, 240.

Egyptian. See *Embalming*. See *Ibes*.

Eider duck, iii. 308; remarkable for the warmth of its neſt, 309.

Elaboratory, bowels of ruminating animals conſidered as an elaboratory, with veſſels in it, ii. 38; the chymical apparatus for hatching chickens, iii. 123.

Elaſticity of the air, i. 173.

Elder-berries, hurtful to cocks, iii. 124.

Elephant, not afraid ſingly to make oppoſition to the lion, ii. 160; not leſs remarkable for its ſize than its docility; all hiſtorians concur in giving it the character of the moſt ſagacious animal next to man; its height from ſeven to fifteen feet; impoſſible to give an idea of this animal's figure by deſcription; aſſiſted by the art of the engraver, it will but confuſedly repreſent the original; general obſervations about its conformation; of all quadrupeds, the elephant the ſtrongeſt and largeſt, yet neither fierce nor formidable; in its native deſerts ſeldom alone, being a ſocial, friendly creature; the oldeſt conducts the band; the next in ſeniority brings up the rear; order maintained in dangerous marches; never ſo far aſunder as to be incapable of reciprocal aſſiſtance; their invaſions the more diſagreeable, there being no means of repelling them; ſince an attempt to moleſt a drove would certainly be fatal; manner of going againſt him who offers the inſult; do no perſonal injury when ſuffered to feed uninterrupted; moleſted by man, they ſeek all occaſions to be revenged; where they like beſt to live in their natural ſtate; cannot live far from water, and always diſturb it before they drink; often fill their trunk with water, to cool it, or by way of play to ſpurt it out like a fountain; equally diſtreſſed by the extremes of heat and cold; ſwim from the continent into iſlands ſome leagues diſtant; frequently migrate from one country to another, and why; their food of the vegetable kind, loathing all ſort of animal diet; one finding a ſpot of good paſture, invites the reſt to partake of it; precautions by Negroes and Indians againſt them; they often break through their fence, deſtroy the harveſt, overturn their habitations, and then retreat in order, as they made the irruption; looks with attention and friendſhip at its maſter; its ears wipe its eyes, and cover them againſt the flies and duſt; it likes muſic, learns to beat time, moves in meaſure, and joins its voice to the ſound of the drum and trumpet; is pleaſed with the odours that delight man; the orange-flower particularly grateful to its taſte and ſmell; picks up flowers, and is pleaſed with the ſcent; ſeeks the moſt odoriferous plants for food; prefers the cocoa, the banana, the palm, and the ſago tree to all others; eats plants to the roots; their ſenſe of touching moſt delicate; deſcription of its trunk; ſerving all the purpoſes of a hand; breathes, drinks, and ſmells through the trunk; takes a pin from the ground, and unties the knots of a rope, unlocks a door, and writes with a pen; Ælian ſaw an elephant write Latin characters on a board, his keeper only ſhewing him the figure of each letter, ii. 389 to 393; an object too large for the trunk to graſp, is ſucked up by its breath, lifted, and ſuſtained; the trunk its organ of ſmelling, of touching, of ſuction, of ornament, and defence; its neck is ſo ſhort that it muſt turn about to diſcover what is behind; how the hunters eſcape its reſentment; a deſcription of its legs; while young, it bends the legs, but when old or ſickly it wants human aſſiſtance, and chooſes to ſleep ſtanding; a deſcription of its feet, and of its tuſks; theſe, with age, become ſo heavy that it is obliged to reſt them in holes in the walls of its ſtall; they are two; their amazing ſize; they proceed from the upper-jaw, not from the frontal-bones; and are not horns, as ſome have ſuppoſed; nor ever ſhed in a domeſtic ſtate; extraordinary manner of eating; is not a ruminating animal; its ſtomach and inteſtines reſemble thoſe of a hotſe; opinion that the young elephant ſucks with its trunk not with its mouth; referred to future diſcoverers; the ſkin not covered with hair, a few briſtles in the ſcars and wrinkles of the body, and thinly ſcattered over the ſkin, the hide reſembles the bark of an old tree more than the ſkin of an animal; is ſubject to that diſorder known by the name of the elephantiaſis, or Arabian leproſy; in what manner the Indians endeavour to prevent it; the flies torment this animal inceſſantly; what arts it tries to keep them off; in a ſtate of nature, it rarely quits the river, and often ſtands in water up to the belly, ii. 394 to 396; from time immemorial employed for the purpoſes of labour, of war, to increaſe the grandeur of Eaſtern princes, or to extend their dominions; is a native of Africa and Aſia; ſtill retains its natural liberty in Africa; during the ſplendour of the Carthaginian empire they were uſed in the wars; no elephants found on this ſide Mount Atlas; places where they are in great numbers; the greateſt elephants found in Aſia, their price increaſes in proportion to their ſize; the largeſt kept for princes; their colour; that appropriated for the monarch's own riding, kept in a palace, attended by nobles, and almoſt adored by the people; opinions concerning the white elephant; the Eaſtern princes maintain as many elephants as they are able, and place great confidence on their aſſiſtance in an engagement; they never breed in a ſtate of ſervitude, and the generative powers fail when it comes under the dominion of man; duration of pregnancy in the female ſtill a ſecret; what Ariſtotle and others ſay concerning this and their young is doubtful; method of taking them wild in the woods; Negroes of Africa who hunt this animal for its fleſh, take it in pit-falls; its attachment to the perſon who attends it; it comprehends ſeveral of the ſigns made to it, diſtinguiſhes the tone of command from that of anger or approbation, and acts accordingly; executing orders with prudence, eagerly, yet without precipitation; is taught to kneel down, to receive its rider, uſually mounted upon its neck; careſſes thoſe it knows, ſalute ſuch as ordered to diſtinguiſh, and helps to take up part of its load; takes a pleaſure in the finery of its trappings; draws chariots, cannon, or ſhipping, with ſtrength and perſeverance, and ſatisfaction, provided it be not corrected without a cauſe, and that its maſter be pleaſed with its exertions; in what manner the conductor guides it; frequently takes ſuch an affection to its keeper, as to obey no other; has been known to die of grief for killing its conductor in a fit of madneſs; ſurpriſing inſtance of moderation in its fury; a word ſufficient to put it in motion, 397 to 401; a century or two ago, the Indian generals made great dependence upon the number and the expertneſs of their elephants; of late they are little uſed, except for drawing cannon, and tranſporting proviſions, ſtill they are uſed in war in Siam, in Cochin-China, in Tonquin and Pegu; in what manner armed and led to battle; effects of its fury in the field; thoſe placed upon its back, in a ſquare tower, combat as from an eminence, and fling down their weapons with double force; nothing more dreadful or more irreſiſtible than ſuch moving machines, to men unacquainted with the modern arts of war; Romans quickly learned the art of opening their ranks to admit the elephant, and ſeparating it from aſſiſtance, compelled its conductors to ſooth the animal's fury, and to ſubmit; ſometimes inſtead of obeying, turned upon thoſe it was employed to aſſiſt; one elephant is known to conſume as much as forty men in a day; they are now chiefly employed in carrying or drawing burthens throughout the Peninſula of India, it can with eaſe draw more than ſix horſes can remove; it carries upon its back three or four thouſand weight, and upon its tuſks it can ſupport near a thouſand; when puſhed, it moves as ſwiftly as a horſe at full gallop; it travels fifty or ſixty miles a day, and, hard preſſed, almoſt doubles that quantity; heard trotting on at a great diſtance; its tract is deeply impreſſed on the ground, and from fifteen to eighteen inches in diameter; uſed, in India, as executioners, and with what dexterity they perform the horrid taſk; ſometimes they impale the criminal on their enormous tuſks; two ſurpriſing inſtances how ſenſible it is of neglect; the keeper deſpiſing its endeavours when launching a ſhip, the animal redoubled its efforts, fractured its ſkull, and died upon the ſpot; revenge one of them took upon a tailor who pricked its trunk with a needle in Deli; is mindful of benefits; inſtance of it; at the Cape of Good Hope they are hunted for the ſake of their teeth; in what manner; an account of an unhappy huntſman; teeth of the elephant found in a foſſil ſtate; two great grinding teeth, and part of the tuſk of an elephant, diſcovered at the depth of forty-two yards in a lead mine in Flintſhire; tuſks of the elephants that come from Africa, ſeldom exceed two hundred and fifty pounds; it is defeated by the rhinoceros, 402 to 407.

Elephantiaſis, or the Arabian leproſy, a diſeaſe to which man and the elephant are equally ſubject; in what manner the Indians endeavour to prevent it, ii. 396.

Elizabeth, (Queen) her injunction upon faſting, i. 301; in her times, the whole kingdom could not ſupply two thouſand horſes to form the cavalry, ii. 21.

Ellis, his principal experiment upon coraline ſubſtances, iv. 325.

Elk, its ſize equal to that of the elephant, ii. 112; is an animal rather of the buck than the ſtag kind; known in America by the name of the mooſe-deer; is ſometimes taken in the German and Ruſſian foreſts; but extremely common in North America; its horns fortuitouſly dug up in many parts of Ireland, meaſuring ten feet nine inches from tip to tip; a ſmall one, the ſize of a horſe, and the horns little larger than thoſe of a common ſtag; Jocelyn and Dudley deſcribe this animal about eleven feet high; others extend their accounts to twelve and fourteen feet; never diſturbs any other animal, when ſupplied itſelf; a female of this kind ſhewn at Paris in the year 1742; its deſcription; they gave it thirty pounds of bread every day, beſides hay, and it drank eight buckets of water, 113, 114.

Elk (American,) of two kinds, the grey and the black; deſcribed; they prefer cold countries, feeding upon graſs in ſummer, and the bark of trees in winter; time and manner of hunting them; its fleſh very well taſted, and very nouriſhing; its hide ſtrong, and ſo thick as to turn a muſquet-ball; yet is ſoft and pliable; this animal troubled with the epilepſy; is but very indifferently and confuſedly deſcribed by travellers; their various deſcriptions, ii. 115 to 117; in what manner killed by the glutton, 250.

Elops, or *Sea-ſerpent*, its deſcription, iii. 401.

Ely, an iſland, the country round it was once a moſt delightful ſpot; produced grapes that afforded excellent wine; the ſea breaking in, overwhelmed the whole country, i. 162.

Emanuel, (king of Portugal) to try the ſtrength of the elephant and rhinoceros, made them fight, and the elephant was defeated, ii. 407.

Embalming, the Egyptians carried this art to perfection; copious detail of this art as practiſed among them; in Geneſis, Joſeph ſeeing his father expire, ordered his phyſicians to embalm the body, i. 375; various methods of embalming, 376; the art ſtill among the Guanches, ancient inhabitants of the iſland of Teneriff, when the Spaniards conquered it; particulars of their method of embalming; the Peruvians alſo underſtood this art, according to Father Acaſto, 277, 378; a mummy lately dug up in France, ſhews the art more completely underſtood in the weſtern than the eaſtern world, 384.

Embroidery, done in India with porcupine quills, as belts, baſkets, and neceſſary pieces of furniture, ii. 314.

Embryo, its firſt rudiments; in a month an inch long; the male developes ſooner than the female; progreſs and increaſe of it, 254 to 256; in the human, the under jaw much advanced before the upper, 279; brain and ſpinal marrow, firſt ſeen begun, 309; the bones as ſoft as the fleſh i. 336.

Emigration, cauſes of emigration of birds, iii. 51; manner performed, 53, 54.

Emu, an inhabitant of the New Continent, called alſo the American oſtrich; deſcription and places where found; runs ſo ſwiftly, the dogs loſe the purſuit; one ſurrounded by hunters, the dogs avoided its rage; peculiar in hatching its young; the young at firſt familiar; follow any perſon; as they grow older, become cunning and diſtruſtful; their fleſh good to be eaten; they live entirely upon graſs, iii. 69 to 71

Encoubert of Buffon, the tatou of Ray, a ſhelly quadruped, ii. 325.

England, claims dominion over the ſeas encompaſſing Great Britain and Ireland; loſing its ſuperiority upon the ocean, its ſafety becomes precarious, i. 136; late as king James I. the court ſtill furniſhed with a dwarf, a giant, and a jeſter; the aſs entirely loſt under queen Eliſabeth, ii. 29; not infeſted with wolves, 210; the viper the only venomous animal there, iv. 141.

Enquiries moſt intricate generally moſt uſeleſs, i. 242.

Entry, a term in the chaſe of the ſtag, ii. 98.

Ephemere, various kinds of this inſect; its deſcription; colours of their aurelias; their tranſmutations; places were found in abundance; ſhort duration; their impregnation, iv. 222 to 225.

Epicure, the greateſt has the moſt depraved taſte, i. 330.

Epiphanius (St.) lived a hundred and fifteen years, i. 302.

Equator, deſcription of the regions under it, i. 15.

Ermine, its deſcription; alike in figure to the weaſel; its fur the moſt valuable of any; the time in which it is called the ſtoat; manner of moulting its hair; one ate honey, and died ſhortly after; proof of a diſtinct ſpecies from the pole-cat or the martin; one of theſe fed with eggs and fleſh, let them putrefy before it touched either; in Siberia, taken in traps baited with fleſh, and in Norway, ſhot with blunt arrows, or taken in traps; ſometimes found white in Great Britain, and is then called the white weaſel; its fur among us of no value, ii. 228, to 231; preys upon the leming, 302.

Erne, kind of eagle; its diſtinctive marks, ii. 87.

Eruption, of a volcano, remarkable, in 1537, i. 57; of Veſuvius, in which Pliny the naturaliſt was ſuffocated, and the city of Herculaneum was overwhelmed; another of the ſame mountain, in 1707, deſcribed; of Cotopaxi, in 1743, deſcribed by Ulloa; matter thus exploded lies a little below the bed of the mountains, in Mr. Buffon's ſyſtem; but ſupplied from the deeper regions of the earth, 58 to 64.

Eſculapian ſerpent of Italy; its excrement a pleaſing perfume, iv. 131; a domeſtic creature, 152.

Eſox, or the pike, deſcription of this fiſh, iii. 403.

Eſquimaux Indians deſcribed, i. 346.

Evaporation, cold diminiſhing the force of menſtruums, promotes evaporation; theory for the formation of the clouds, i. 212; prevented by moiſt weather; dry froſt aſſiſts evaporation, 213.

Evils, thouſands of natural evils permitted to exiſt in the world, and why, i. 19.

Eunuchs of two kinds, the white and the black, i. 269; made in Italy to improve the voice; inſtance, in our country, of a very fine woman married to an eunuch, 270.

Euphæmia, a city in Calabria, ſunk by an earthquake, i. 73.

Euphrates, a river, its ſources, i. 124; receives eleven rivers, 128.

Eurites, a city ſwallowed by an earthquake, i. 97.

Europeans reſemble our common parent more than any of the reſt of his children, i. 360; argument which ſuffices to prove it, 361.

Euſtachian tube, a paſſage from the ear into the mouth; its uſe, i. 324.

Ewe. See *Buck-goat*, ii. 56.

Excrements of ſome ſerpents kept as the moſt pleaſing perfume at Calicut and Cranganon, in Eaſt India, iv. 131.

Executioner. elephants in India uſed as ſuch; impale the criminals on their tuſks, ii. 403.

Exerciſe (Manual), hares taught to go through it, ii. 258.

Exhalations. mineral, raiſed by ſubterranean heat, i. 195; when copious every where fatal, 188.

Exocetas, the flying-fiſh, its deſcription, iii. 403.

Experience, repeated, ſhows how ſeldom pains are ſuffered, or pleaſures enjoyed, to the utmoſt, i. 344.

Experiment, by Mr. Belcher, upon the circulation of the blood through the bones, i. 336; made by approaching a looking-glaſs to the mouth to diſcover breathing, very uncertain, 344; of a carp placed under an air-pump, iii. 329; the famous experiment of Malpighi, concerning the ſtigmata of the caterpillar, iv. 232.

Extraneus, or foſſil ſhells, found in the bowels of the earth, iv. 40.

Eyes, opened by the infant the moment of its birth, i. 259; particularly in them the paſſions are painted, 274; ſmall and nearly cloſed, are liked in China and Japan, 272; different colours of the eye, whence they ariſe; eyes of oxen are brown; thoſe of ſheep of a water-colour; of goats are grey; and thoſe of moſt white animals are red; diſtance between the eyes leſs in man than in any other animal, 275; Montaigne diſliked thoſe men who ſhut one eye in looking upon any object, 281; in what circumſtances women with child are ſaid to be all mouth and eyes; the lower eye-lids, in women with child drawn downwards, 287; of all parts the animal has double, the eyes produced ſooneſt, 309; privation of ſeeling and ſight would miſrepreſent the ſituation and number of all things around us, 310; two contribute to diſtinct and extenſive viſion, 311; both eyes ſee round the object, and give it that heightened relief which no painting does attain to; in either, if there be a point which has no viſion, the defect is corrected by having the organ double; eaſy experiment to be convinced of it, 312; objects at a diſtance are rarely equal in both eyes; the beſt eye ſees objects largeſt; infants, having their eyes leſs, muſt ſee objects ſmaller in proportion; when we look at an object extremely brilliant, viſion becomes indiſtinct, and why; how far the eye can accommodate itſelf to darkneſs, 317; remarkable inſtance of it in a major under King Charles the Firſt, 318; whence have ariſen the ſmall eyes of the Tartars and Chineſe, 360; Eaſtern poets compare the eyes of their miſtreſſes to thoſe of the gazelle; the Greeks reſemble the eyes of a beautiful woman to thoſe of a cow, ii. 76; of all animals, natives of this climate, none have an eye ſo beautiful as the ſtag, 93; that of the wolf opens ſlantingly upwards in the ſame direction with the noſe, 203; of the fox placed obliquely, like thoſe of the wolf, 213; of the civet ſhine in the night, 248; thoſe of the hare placed backwards, to ſee behind it as it runs, and theſe are never wholly cloſed, 255; peculiar advantages of the ſmalneſs of the eye in the mole, 304; deſcription of the eyes of birds of the owl kind; in the eyes of all animals, a complete proviſion to ſhut out too much light, or to admit a ſufficiency, by contraction and dilatation of the pupil, iii. 108; thoſe of the great Greenland whale not larger than thoſe of an ox, 342; of the ſnail on the points of its largeſt horns, iv. 43; peculiarities in the eyes of the cameleon, 115; eyes of the butterfly have not all the ſame form; the outward coat has a luſtre diſplaying the various colours of the rainbow; examined a little cloſely, it will be found to have the appearance of a multiplying-glaſs, 243; the beetle, in its worm ſtate has no eyes, 293.

Eye-brows, joining in the middle conſidered a peculiar grace by Tibullus, and by the Perſians, i. 271; Le Brun's directions regarding the paſſions, place the principal expreſſion in them; ſuch as have them moſt at command are the beſt actors, 276; the Talapoins of Siam ſhave the eye-brows of the children committed to their care, 282.

Eye-laſhes, men and apes only have them upon the upper and lower lids, all other animals want them on the lower lid, i. 276.

Eye-lids, in birds and amphibious quadrupeds, the lower lid alone has motion, fiſhes and inſects have no eye-lids, i. 276.

Face, its form the reſult of cuſtom, i. 360. See *Beauty*, i. 374.

Falcon-gentil, a kind of hawk; it purſues the gazelles, ii. 83; many people admire its fleſh, and dreſs it for eating, ſays Belonius, iii. 80; method of training up this bird; falconry, much diſuſed among us, was a principal amuſement of our anceſtors; the falcon-gentil and the peregrine, much leſs than the gyr-falcon, which exceeds all others in largeneſs; deſcription of the gyr-falcon; a courageous and fierce bird, not fearing the eagle; it chiefly flies at the ſtork, the heron, and the crane; is chiefly found in the northern regions, but loſes neither ſtrength nor courage, when brought into the milder climates; the falcon-gentil moults in March and ſooner; the peregrine does not moult till Auguſt; the common falcon is of ſuch ſpirit, that, like a conqueror in a country, he keeps all in awe and ſubjection to his proweſs; young falcons, though depreſſed by captivity, will, when brought out, fly at barnacles and wild geeſe; the falcon's purſuit of the heron, kite, or woodlark, the moſt delightful ſport; names of the falcons in uſe here and in other countries; among the Welch, the king's falconer the fourth officer of the ſtate, was forbid to take more than three draughts of beer from his horn, leſt he ſhould neglect his duty, 97 to 102.

Falconers, catch the kite for the purpoſes of training the falcon, and how, iii. 112, 113.

Fallopius, the two tubular veſſels perceived by him, i. 239.

Famine, ſupported by carnivorous animals for ſeveral weeks together, i. 406.

Fat of the ſhamois, its medicinal virtue; fat of animals found efficacious in ſome diſorders, ii. 74; of the manati, expoſed to the ſun, has a fine ſmell and taſte, and exceeds the fat of any ſea-animal; the heat of the ſun will not ſpoil it, nor make it rancid; ſeveral other qualities of this fat, ii 353.

Father-laſher, deſcription of this fiſh, iii. 400.

Fawn, name of the buck and the doe the firſt year, ii. 105.

Feathers of birds deſcribed, iii. 38; of the oſtrich almoſt as ſoft as down, 62; different uſes made of gooſe-feathers, 305, 306.

Feather-beds utterly unknown in countries bordering on the Levant, and all Aſia; ancients did not uſe feather-beds; Pliny ſpeaks of bolſters of feathers for their heads; feathers make a conſiderable article of commerce; different qualities; beſt method of curing them; old feathers more valuable than new, iii. 305, 306.

Fecundity of the rabbit greater than of the hare, ii. 262.

Feeling, deprived of feeling, our eyes would miſrepreſent the ſituation and the number of all things around us, i. 310; blind men have this ſenſe finer than others, and why; the groſſeſt and the moſt uſeful of the ſenſes; no total deprivation of it but with life; thoſe parts moſt exerciſed in it, acquire the greateſt accuracy; the fingers, by habit, greater in the art than others, not from their having more nerves; fiſhes having no organs for feeling, muſt be the moſt ſtupid of all animals; feeling, the guardian, the judge, and the examiner of all the ſenſes, is never found to deceive, 331, 332.

Ferret, has eyes of a red colour, i. 275; not found at preſent here, but in the domeſtic ſtate; its deſcription; a native of the torrid zone; naturally ſuch an enemy of the rabbit, that a young ferret, although unacquainted with the kind, will fiercely attack and bite even a dead one; uſe of ferrets in warrens to enter the holes muzzled, and drive the rabbits into the nets at the mouth; to bring the ferret from his hole, ſtraw and other ſubſtances burnt at the mouth; the female leſs than the male, whom ſhe ſeeks with great ardour, and often dies without being admitted; they ſleep almoſt continually, and the inſtant they awake ſeem eager for food; are uſually fed with bread and milk; breed twice a year; ſome devour their young as ſoon as brought forth, and then become fit for the male again; the litter uſually from five to ſix young, and theſe conſiſt of more females than males; its ſcent fœtid; has attacked and killed children in the cradle; is eaſily irritated, and then ſmells more offenſively; its bite difficult of cure; has eight grinding teeth; to the ferret kind may be added an animal called by Mr. Buffon the vanſire, ii. 231 to 233; comes originally from Africa, 265.

Fever, opinion that the lion is in a continual fever, ii. 159.

Fewmet, name of the excrement of the ſtag, ii. 98.

Fibres, muſcular, compoſe the ſtomachs of inſects, ii. 40.

Fieldfare, bird of the ſparrow kind, iii. 196.

Fielding. See *Smile*.

Figure, little known exactly of the proportion of the human figure, i. 288; different opinions concerning it, 289; whence proceed the variations in the human figure, 360; the oldeſt meaſure of the human figure in the monument of Cheops, in the firſt pyramid of Egypt, 374.

Finder, a dog of the genourous kind, ii. 192.

Fins, different purpoſes they anſwer in fiſhes, iii. 320 to 322; thoſe of the whale; their uſe, 341, 342, 344.

Fin fiſh, iii. 341; its food, 345.

Fingers, by habit, and not from a greater number of nerves, become exacter in the art of feeling than any other part, even where ſenſation is more delicate and fine, i, 331.

Fire, perpetual in the kingdom of Perſia, i. 55; advantages ariſing from the ſubterranean fires, 76; put out by the ſun ſhining upon it, and why, 193; fleeting balls of fire, 217; great globe of fire ſeen at Bononia in Italy, not leſs than a mile long, and half a mile broad, 219; lighted to preſerve herds and flocks from animals of the cat kind, ii. 158.

Fireflare, Pliny, Ælian, and Oppian, ſupply the weapon of this fiſh with a venom affecting even the inanimate creation; reaſons to doubt of it, iii. 375, 376.

Fiſhes, petrified, found in the mountains of Caſtravan, i. 32; fiſh in abundance found in a new formed iſland; thoſe who eat of them died ſhortly after, 77; cannot live in water whence the air is exhauſted, 183; ſhowers of fiſhes raiſed in the air by tempeſts, 224; moſt of them produced from the egg, 24;

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the chief inſtruments in the motion of a fiſh are the fins; in ſome they are more numerous than in others; it is not always the fiſh with the greateſt number of fins that has the ſwifteſt motion; how the fins aſſiſt the fiſh in riſing or ſinking, in turning or leaping out of the water; all this explained by the experiment of a carp put into a large veſſel; all fiſhes covered with a ſlimy glutinous matter, that defends their bodies from the immediate contact of the ſurrounding fluid; they fall behind terreſtrial animals in their ſenſations; their ſenſe of touching and ſmelling; their ſenſe of taſting; hearing is found ſtill more imperfect, if found at all; Mr. Gouan's experiment to this purpoſe; from it is learned they are as deaf as mute; their ſenſe of ſeeing; their brain; their rapacity inſatiable; when out of water, and almoſt expiring, they greedily ſwallow the bait by which they were allured to deſtruction; the maw placed next the mouth, and though poſſeſſed of no ſenſible heat, is endued with a faculty of digeſtion, contrary to the ſyſtem, that the heat of the ſtomach is alone ſufficient for digeſtion; though for ever prowling, can ſuffer want of food very long; inſtances of it; life of a fiſh but one ſcene of hoſtility, violence, and evaſion; the cauſes of animal migrations; all ſtand in need of air for ſupport; thoſe of the whale kind come to the ſurface of the ſea every two or three minutes to breathe freſh air; experiment of a carp in a large vaſe of water, placed under an air-pump; general method of explaining reſpiration in fiſhes; the deſcription and uſes of their air-bladder; full play of the gills prevented, or the bony covers kept from moving, the animal would fall into convulſions, and die, 319 to 330; ſome fiſhes have no air-bladder; can live but a few minutes without air; nothing more difficult to account for than the manner of getting this ſupply; no part of the account of the uſe of the air-bladder well ſupported; Bacon's obſervations upon their growth and age; two methods for determining the age of fiſhes, more ingenious than certain; a carp found to be a hundred years old; the diſcovery confirmed by authors; longevity of theſe animals, nothing compared to their fecundity; ſome multiply by millions; ſome bring forth their young alive, and ſome produce eggs; the former rather the leaſt fruitful; the viviparous blenny brings forth two or three hundred at a time, all alive, and playing together round the parent; different ſeaſons for depoſiting ſpawn; ſome fiſhes have the tenderneſs of birds or quadrupeds for their young; their copulation as yet a doubt; the fleſh of fiſhes; queſtion to the learned concerning the fleſh of fiſhes; cetaceous fiſhes, 331 to 336; cartilaginous fiſhes, 360; ſucking-fiſh ſticks to the ſhark; called the ſhark's pilot, and why, 368; all fiſh more delicate about a baited hook than their ordinary food, 371; beſt bait for all is freſh herring cut in pieces of a proper ſize; experience ſhews, the larger fiſh take a living ſmall one upon the hook ſooner than any other bait, 374; more than thoſe of the ray kind poſſeſſed of the numbing quality; Condamine informs us of a fiſh with the powers of the torpedo, and reſembling a lamprey; lamprey of the Engliſh Severn the moſt delicate fiſh whatever, 379, 380; *ſun-fiſh* deſcribed, 389; *lump-fiſh*, 390; *pipe-fiſh*, 391; *galley-fiſh*, 393; ſpinous fiſhes, 398; Mr. Gouan's ſyſtem of ſpinous fiſhes, 398 to 404; uſe of it; all fiſh of the ſame kind have the ſame number of bones; the ſmall lean, and with many fins, the moſt bony; vulgar expreſſion, that fiſhes at ſome ſeaſons are more bony than at others, ſcarce deſerves contradiction; none imbibe the ſea-ſaltneſs with their food, or in reſpiration; whence then do ſome fiſhes live there, and quickly expire in freſh water; ſome tribes live only in the ſea; others only in freſh water; ſome a part of the ſeaſon in one, and a part in the other, as the ſalmon, the ſhad, the ſmelt, and the flounder; ſome fiſh, as the eel, deſcend the freſh-water ſtream, to bring forth their young in the ſea; in what ſeaſon; long voyages undertaken by ſome tribes that conſtantly reſide in the ocean, and may be called the *fiſh* of paſſage; ſtated returns, and regular progreſs of theſe fiſh of paſſage the moſt extraordinary circumſtances in the hiſtory of Nature; names of ſeveral migrating fiſhes; of all ſuch, the herring and pilchard take the moſt adventurous voyages; places where found in abundance, 404 to 410; in the iſlands of the Indian Ocean, an over-quantity, in ſhoals, on the ſwamps, dried up by the ſun; the putrefaction renders the country unhealthful; amazing propagation along our coaſts and rivers not proportionate to the quantities among the iſlands of the Indian Ocean; places where the ſpawn is depoſited; doubts whether moſt fiſh come from the egg completely formed; manner in which the eggs of fiſhes are impregnated wholly unknown; growth of fiſhes; inſtance in the growth of mackarel; all live upon each other, in ſome ſtate of their exiſtence; of thoſe in the ocean of the ſpinous kinds, the dorado the moſt voracious; flying-fiſh chiefly ſought by the dorado; their warfare; opinion that all fiſhes are natives of the ſea, founded upon their ſuperior fecundity of breeding twenty to one; certainly freſh-water fiſhes abate of their courage and rapacity; greedineſs of the ſea-fiſh to devour the bait prodigious compared with the manner it is taken in freſh water; difference of bait with which they are caught; ſome fiſhes rendered ſo torpid in the northern rivers, as to be frozen up in the maſſes of ice, and continue there ſeveral months, ſeemingly without life or ſenſation, waiting the approach of a warmer ſun, to invite them to life and liberty; each ſpecies of fiſh infeſted with worms of different kinds; moſt vivacious animals; often live upon ſubſtances poiſonous to the more perfect claſſes of animated nature; numbers of fiſhes making poiſonous wounds, ſcarcely to be doubted; ſome fiſhes being poiſonous is notorious, the cauſe inſcrutable; Dr. Grainger, after reſiding many years at St. Chriſtopher's, affirms, that of fiſh caught at one end of the iſland, ſome were good and wholeſome, while others of the ſame kind, taken at a different end, were dangerous, and commonly fatal; the Philoſophical Tranſactions give an account of poiſonous qualities of fiſh at New Providence; all kinds, at different times, alike dangerous; the ſame ſpecies this day ſerving as nouriſhment, the next found fatal; ſpeculations and conjectures to which theſe poiſonous qualities have given riſe, 415 to 422.

File fiſh, moſt wonderful of the ſhelly tribe, vi. 67. See *Pholades*.

Fiſhery of pearls, ſeveral; chiefly carried on in the Perſian Gulph, iv. 63; the people deſtined for the pearl-fiſheries; they die conſumptive; in what manner they fiſh for pearls, 64, 65.

Fiſhing-frog, from its deformity called the *ſea-devil*; conceit that this fiſh uſes its two long beards or filaments for fiſhing; Rondelet ſays, that the bowels taken out, the body appears tranſparent; and with a lighted candle in, it has a formidable appearance; fiſhermen have a great regard for this ugly fiſh, as an enemy to the dog-fiſh; when taken they ſet it at liberty, iii. 389, 390.

Fiſſures, perpendicular, found in every field, and every quarry; their cauſes, i. 42.

Fiſtularia, deſcription of this fiſh, iii. 403.

Flame will burn under water; none found continuing to burn without air, i. 192.

Flamingo, the moſt remarkable of the crane kind, the talleſt, bulkieſt, and moſt beautiful; its deſcription; chiefly found in America, once known on all the coaſts of Europe; in deſerted regions, the flamingos live in a ſtate of ſociety, and under a better polity than others of the feathered creation; delicacy of its fleſh; when the firſt Europeans in America killed one, the reſt regarded the fall in fixed aſtoniſhment; thus the fowler levelled the flock, before any began to eſcape; it is now one of the ſcarceſt and ſhyeſt birds in the world; places it chiefly inhabits; always appoint one as a watch; who gives notice of danger with a voice ſhrill as a trumpet; Negroes fond of their company, and think their ſociety a gift of heaven, and protection from evils; thoſe killed hidden in the long graſs, to prevent ill-treatment from the blacks diſcovering the murder of their ſacred birds; are frequently taken with nets; refuſe all nouriſhment when taken; pine and die, if left to themſelves in captivity; its tongue is the moſt celebrated delicacy, a diſh of them, ſays Labat, is a feaſt for an emperor; a Roman emperor had fifteen hundred flamingo's tongues ſerved up in a diſh; their tongue larger than that of any other bird; its fleſh; they move in rank like cranes; appear in flight of a bright red as a burning coal; manner of feeding very ſingular; ſavages of Canada call it *tococo*, and why; time of breeding, and their neſts; number of their eggs; colour when young; they become familiar in five or ſix days, eat out of the hand, and drink ſea-water; but generally pine away, wanting their natural ſupplies, and die in a ſhort time; ſavages make ornaments of their plumes; and the ſkin ſometimes ſerves the Europeans to make muffs, iii. 247 to 251.

Flea, perſecutes the hare, ii. 260; it can draw a chain a hundred times heavier than itſelf, and eat ten times its own ſize of proviſions in one day, iv. 163; its deſcription, 174; arboreſcent water-flea, or monoculus, deſcribed, 184; Leuwenhoeck has diſcovered above ſix thouſand facets on the cornea of a flea, 243.

Flemings poſſeſſed the art of cloth-working in a ſuperior degree; were invited to ſettle here, ii. 60.

Fleſh, dries at Cuſco like wood, without corrupting, i. 379; the Perſians eſteem that of the wild aſs ſo highly, that its delicacy is a proverb among them, ii. 25; of the fallow-deer preferred to any other, 104; of the roebuck beween one and two years old, allowed the greateſt delicacy know, 112; of the tiger is good for food, ſome hold it ſuperior to mutton, 172; of dogs ſold in ſhambles all over China; and the Negroes of the coaſts of Guinea eſteem it a delicacy; as likewiſe that of toads, lizards, and tigers, 198; that of the wolf very indifferent; no creature known to eat it but the wolf himſelf, 212; of the ſquaſh, tolerable food, 243; that of the glutton not fit to be eaten, 253; of the hare religiouſly abſtained from by the Jews, ancient Britons, aud Mahometans, 261; of the paca conſidered a great delicacy, 282; of the tendrac, thought by the Indians a great delicacy, 311; of the pangolin, conſidered a very great delicacy by the Negroes of Africa, 319; of the armadilla, or tatou, ſaid to be delicate eating, 323; of the ſeal formerly found place at the tables of the great, 350; of the monkey liked by the Negroes, 374; of the oſtrich proſcribed in ſcripture unfit to be eaten, iii. 63; of the emu, or the American oſtrich, good to be eaten, 70; of the dodo, good and wholeſome eating, 76; of the vulture, falcon, and oſprey, when young, excellent food according to Belonius; that of carnivorous birds ſtringy and ill-taſted, ſoon corrupting, and tinctured with that animal food upon which they ſubſiſt, 80; of the bird condor, as diſagreeable as carrion, 89; of the peacock, keeps longer unputrefied than of any other animal, 126; of the pheaſant, conſidered as the greateſt dainty, 132; of the quail, a very great delicacy, 146; that of the partridge ſo valued by the French, according to Willoughby, that no feaſt could be complete without it, 142; of the toucan tender and nouriſhing, 162; of the young herons in particular eſtimation in France, 240; of the bittern greatly eſteemed among the luxurious, 244; of the puffin, formerly by the church allowed on lenten days, 295; of fiſhes yields little nouriſhment; queſtion propoſed to the learned concerning it, 335; of the young porpeſſe ſaid to be as well taſted as veal, 359; of the ſhark hardly digeſtible by any but Negroes, who are fond of it to diſtraction, 369; of the turtle is become a branch of commerce, iv. 28; that of ſome crabs is poiſonous, 16; of the great Mediterranean turtle ſometimes poiſonous, 26.

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Flounder, known to produce in one ſeaſon above one million of eggs, iii. 333.

Fluids, aſcending in veſſels emptied of air; riſing in capillary tubes, and how this comes to paſs, i. 113.

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Fly-trap, name of a flower, cloſing upon the flies that light upon it, iv. 307.

Fœtus, the canal of communication through which the blood circulates in the fœtus, without going through the lungs, has been found open in ſome bodies that have been diſſected, iv. 64.

Fongwhang, natives of China give a fantaſtic deſcription of this imaginary bird, iii. 134.

Fontenelle, a celebrated writer, of a weak and delicate habit of body; the remarkable equality of his temper lengthened out his life to above a hundred; nothing could vex or make him uneaſy, i. 339, 340.

Food, man can live without it for ſeven days; a Scotchman for the ſpace of ſix weeks took no food at all, i. 302.

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Foxes, hunt in packs, ii. 186; their cubs born blind, like thoſe of the dog; the fox lives about twelve or fourteen years; remarkable inſtance of parental affection of a ſhe-fox; all animals make war upon the fox; even the birds; refuſes to engender with the dog; brings forth fewer than the dog, and but once a year; the female goes with young ſix weeks, and ſeldom ſtirs out while pregnant; various colours of them; three varieties of this animal in Great Britain; grey-hound fox, maſtiff-fox, and cur-fox; round the pole they are all colours; jackal taken for the fox; ſkin of the black fox moſt eſteemed, a ſingle ſkin ſelling for forty or fifty crowns, 215 to 217; in Greenland do not change colour at all, 230; taken young are gentle only while cubs, growing older, diſcover their natural appetites of rapine and cruelty. 187; nothing eatable comes amiſs to them, rats, mice, ſerpents, toads, and lizards; inſects, crabs, ſhrimps, and ſhell-fiſh; carrots, wax, and honey, even the hedgehog, 214; chaſe of the fox; their offenſive ſmell often the cauſe of their death; way they find to ſubſiſt; name given by huntſmen to a fox of the ſecond year; old fox the name for the third year, 212 to 215; many animals in this country bred between a dog and a fox; experiments prove neither the wolf nor the fox of the ſame nature with the dog, each a ſpecies perfectly diſtinct, 199; exactly reſembles the wolf and the dog internally, 212; deſcription; eyes obliquely ſituated like the wolf, 213; often takes poſſeſſion of the hole quitted by the badger, or forces it from its retreat by art, iii. 19.

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Garter-fiſh, the lipidopus, its deſcription, iii. 403.

Gaſteroſteus, or the ſtickleback, deſcription of this fiſh, iii. 401.

Gazelles, neither goat nor deer; partake of both natures; they form a diſtinct kind; their deſcription; of all animals it has the moſt beautiful eye; Eaſtern poets compare the eyes of their miſtreſſes to thoſe of the gazelle; Buffon makes but twelve varieties; their names and deſcriptions; comparing them together, we find but ſlight diſtinctions; are inhabitants of the warmer climates; no animals, but of the winged kind, can overtake them; are purſued by falcons, and this hunting is a principal amuſement among the great in the Eaſt; alſo hunted with the ounce; another way of taking them; keep in ſolitary and inacceſſible places, ii. 75 to 84; the bubalus, more properly one of Africa, 117; the moſt uſual prey for the lion, in deſerts and foreſts, 159; the prey of the panther, 178; purſued by the jackal, makes towards houſes and towns, 219.

Gekko, a kind of ſalamander, iv. 107.

Generation, moſt complete where feweſt animals are produced, i. 256; late diſcovery that male fiſhes have two organs of generation, iii. 333; all animals of the ſnail kind are hermaphrodites; each containing the inſtruments of generation double, iv. 49; theſe organs in the muſcle, 55; male or female frogs have no external inſtruments for that uſe, 73.

Genet, its odour more faint than civet; deſcription of this animal; reſembles the martin; more eaſily tamed; Belonius has ſeen them at Conſtantinople tame as cats; glands open differently from others of its kind; called the cat of Conſtantinople; never found in mountains nor dry places; its fur valuable; ſpecies not much diffuſed; countries where it is found; the moſt beautiful, cleanly, and induſtrious animal; keeps a houſe free from mice and rats by its ſmell, ii. 244, 245.

Genet, of the province of Andaluſia the beſt, ii. 14.

Georgians, their deſcription, i. 355.

Gerbua, has four feet, uſes only the hinder in running or reſting; the ſwifteſt creature in the world; deſcription; countries where found; lives upon vegetables, and burrows like rabbits; its habits, iii. 29, 30.

Gerenda, a ſerpent to which the natives of Calicut and thoſe of the Mozambique coaſt pay divine honours, iv. 152.

Germany, the meaneſt peaſant kills a cow for his table, ſalts and hangs it up, and preſerves it as a delicacy all the year round, ii. 41.

Geſner, minutely deſcribes a variety of mouſe-traps, ii. 293; places bats among birds, ii. 326.

Giant, in England, as late as King James I. the court had one, i. 366.

Giants, probability of the race affirmed, poſſibility of their exiſtence denied;

Grew's opinion; Ferdinand Magellan, a Portugueſe, firſt diſcovered a race of ſuch people, towards the extreme coaſt of South America, aſſent to the exiſtence of this gigantic race of mankind; travellers confirm it; ſeen here, have the ſame defects of underſtanding as dwarfs; are heavy, phlegmatic, ſtupid, and inclined to ſadneſs, i. 370 to 373.

Gibbon, the long armed ape, its deſcription, ii. 364, 365.

Gills, their free play prevented, the animal falls into convulſions and dies, iii. 328.

Giltbead, called dolphin by ſailors; its deſcription, iii. 399.

Gimmero, imagined a breed between an aſs and a bull, ii. 30.

Glands, furniſh the fœtid ſubſtances in animals of the weaſel kind, ii. 227; of the genet open differently from others, 244; unctuous in birds to preſerve their feathers, iii. 37; ſalivary in the gullet and crop of birds, 43.

Glaſs, a looking-glaſs held to the mouth of a perſon ſuppoſed to be dead, an uncertain experiment for determining latent life, i. 344.

Glitters, little impreſſions ſo called in the heads of ſtags, ii. 98.

Globe of fire riſing from the ſide of the mountain Pichinca; a great one ſeen at Bononia, in Italy, in the year 1676; paſt weſtward at a rate of a hundred and ſixty miles in a minute; could not be leſs than a mile long, and half a mile broad, i. 219.

Globe of glaſs, filled with water, aſſumes ſucceſſively all the colours of the rainbow, i. 221.

Glouceſter, its corporation had an old cuſtom annualy to preſent the king with a lamprey pye, iii. 382.

Glow-worm, male and female of this ſpecies differ entirely from each other; how and in what manner in which light ſent forth by the glow-worm is produced, hitherto inexplicable; the light continues to grow paler, and at laſt is totally extinct, if the worm be kept for ſome time, iv. 297, 298.

Glue, made of the horns of the rein-deer, ii. 127; Mr. Jackſon found out a method of making glue to anſwer the purpoſes of iſinglaſs, iii. 388.

Glutton, the moſt dangerous and moſt ſucceſsful perſecutor of the rein-deer; its manner of killing that deer, ii. 129; belongs to the weaſel kind; there is no preciſe deſcription of it, ſome reſembling it to the badger, ſome to a fox, others to a hyæna; one brought alive from Siberia, was three feet long, and about a foot and a half high, 395; ſo called from its voracious appetite; countries where found; called carcajou in North America; general deſcription; Ray and others doubt of its exiſtence; takes its prey by ſurpriſe, and in what manner; darts down from the branches of trees upon the elk or the rein-deer, ſticks its claws between their ſhoulders, and remains there firm, eating their necks, and digging to the great blood veſſels that lie on that part; amazing quantity one of theſe animals can eat at a time; that ſeen by Mr. Klein, without exerciſe or air, taken from its native climate, and enjoying but indifferent health, ate thirteen pounds of fleſh every day, and was not ſatisfied; it continues eating and ſleeping till its prey bones and all, be devoured; prefers putrid fleſh to that newly killed; it is ſo ſlow that any quadruped can eſcape it, except the beaver; purſues it upon land, but the beaver taking water, the glutton has no chance to ſucceed; called the vulture of the quadrupeds; in what manner it makes up by ſtratagem the defects of nature; the female goes with young four months, and brings forth two or three; the male and female equally reſolute in defence of their young; is difficult to be ſkinned; does not fear man; is a ſolitary animal, and never in company but with its female; couples in the midſt of winter; the fleſh not fit to be eaten; the fur has the moſt beautiful luſtre, and preferred to all, except the Siberian fox, or the ſable, ii. 248 to 253.

Gnats, in Lapland, fill the air like clouds of duſt; are chiefly enemies to the rein-deer; remedies uſed againſt them, ii. 121; proceed from a little worm, uſually ſeen at the bottom of ſtanding waters; curious manner in which the eggs are laid; in their egg ſtate, it reſembles a buoy, fixed by an anchor; different ſtates of the inſect; in its laſt tranſformation diveſted of a ſecond ſkin, in the next it reſigns its eyes, its antennæ, and its tail, and ſeems to expire; from the ſpoils of the amphibious animal appears a little winged inſect, whoſe ſtructure is an object of admiration; deſcription of this inſect; and of its trunk, juſtly deemed one of Nature's maſter-pieces; implement with which the gnat performs its work in ſummer; places where it ſpends the winter; the little brood ſo numerous that the water is tinged with the colour of the ſpecies; ſome gnats oviparous, others viviparous, and come forth in a perfect form; ſome are males, and unite with the female; ſome are females, requiring the male; others are of neither ſex, and produce young, without copulation; at the ſixth generation their propagation ſtops, the gnat no longer reproduces its likeneſs, but requires the male to renew its fecundity; produced in multitudes beyond expreſſion in America; and found of all ſizes, from ſix inches long, to a minuteneſs beyond the perception of the common eye; native Indians, anointed with oil, ſleep in cottages covered with thouſands of gnats, and have not their ſlumbers interrupted by theſe cruel devourers, iv. 303, to 306.

Goat, its eyes are grey, i. 275; from Europe imported into South America, ſoon degenerates; as it grows leſs, it becomes more prolific; imported to the African coaſt, it ſeems to improve, i. 411; goat and ſheep propagate together, and may be conſidered as of one family; the buck-goat produces with the ewe an animal, in two or three generations returning to the ſheep, and retaining no marks of its ancient progenitor, ii. 56; more fitted for a life of ſavage liberty than the ſheep; it is not eaſily confined to its flock, but chooſes its own paſture, and loves to ſtray from the reſt; delights in climbing precipices; is capricious and vagrant; is not terrified at ſtorms, or incommoded by rain; immoderate cold affects it, and produces a vertigo, to which this animal is ſubject; proof of its being naturally the friend of man, and that it ſeldom reſumes its foreſt wildneſs, when once reduced into the ſtate of ſervitude; in ſome places they bear twice a-year; in warmer climates generally bring forth three, four, and five at once; milk of goats medicinal; not apt to curdle in the ſtomach; fleſh of the goat, properly prepared, ranked by ſome not inferior to veniſon; is never ſo good and ſo ſweet in our climate, as mutton; no man can attend above fifty goats at a time; fleſh of the goat found to improve between the tropics; remarkable varieties in this kind; that of Natolia, by Mr. Buffoon called *goat of Angora*; its deſcription; the *Aſſyrian goat* of Geſner; chiefly kept about Aleppo; *little goat of America*, the ſize of a kid, has hair as long as the ordinary breed; *Juda goat*, not larger than a hare; common in Guinea, Angola, and the coaſt of Africa; *blue goat*, at the Cape of Good Hope; its deſcription, 65 to 69; boundaries between the goat and deer kind difficult to fix, 75; *Bezoar goat*, the *paſan*, found in the mountains of Egypt, &c. 77; *African wild goat* of Grimmius, fourth anamolous of the kind; its deſcription, 81; goats eat four hundred and forty-nine plants, and reject a hundred and twenty-ſix, 133; in Syria, remarkable for their fine, gloſſy, long, ſoft hair, 153.

Goat-ſucker, a nocturnal ſwallow; deſcription and habits, iii. 213.

Gobius, the gudgeon, deſcription of this fiſh, iii. 399.

Godignus, in his hiſtory of Abyſſinia, exaggerates the effects of the ſhock of the torpedo, to an incredible degree, iii. 379.

Godwit, its dimenſions, iii. 253; a bird of paſſage, 156.

Goiam, kingdom, where the Nile takes its riſe, i. 25.

Gold, never contracts ruſt, and why; except in places where much ſalt is uſed, i. 181.

Golden-eye, bird of the duck kind, iii. 308.

Goldfinch, bird of the ſparrow kind, iii. 196; learns a ſong from the nightingale, 213.

Gooſe, marks of the gooſe kind; abſtained from by the ancients as indigeſtible, iii. 297, 298; one known to live a hundred years; marks of the tame and wild ſort; wild ſuppoſed to breed in the northern parts of Europe; flight regularly arranged, 303, 304.

Gooſe (Brent), moſt harmleſs, but for their young purſue dogs and men; uſe of its feathers in beds unknown in countries of the Levant and Aſia; feathers a conſiderable article of commerce; different qualities of them; the beſt method of curing them, iii. 304 to 306.

Gooſe (Soland), deſcribed. See *Gannet*, iii. 278.

Gooſeander, a round-billed water-fowl, its deſcription; feeds upon fiſh, iii. 296.

Gordian, the emperor, wrote a poem upon the halcyon, of which are no remains, iii. 315.

Goſs-hawk, of the baſer race of hawks, iii. 98; taught to fly at game; little obtained from its efforts, 104.

Gottenburgh, in Sweden, a cataract near it, i. 130.

Gouan, a learned Frenchman, his ſyſtem deſerves applauſe for more than its novelty; how followed in arranging the ſpinous claſs of fiſhes, iii. 397.

Graaf, his obſervations upon the progreſs and increaſe of animals in the womb, i. 250.

Grampus, fierce and deſperate in defence of its young; remarkable inſtance, iii. 338; deſcription and habits, 355.

Graſshopper, a ruminating inſect, or ſeemingly ſo, ii. 39; differences between ours and the cicada of the ancients; great varieties of this animal in ſhape and colour; deſcription of the little graſshopper, that breeds plentifully in meadows, and continues chirping through the ſummer; the male of this tribe only vocal; how their fecundation is performed; the male or female never ſurvive the winter; their eggs; from firſt appearing, poſſeſſed of wings; how it gets rid of the outer ſkin; their food; places where they depoſit their eggs, iv. 206 to 210.

Grave, the greateſt care recommended not to commit thoſe deareſt to us to the grave, before real ſigns of certain death be aſcertained, i. 344.

Greata, river in Yorkſhire running under ground, and riſing again, i. 132.

Grebe, deſcription of the bird; reſidence and habits; perpetually diving, and very difficult to be ſhot; never ſeen on land; chiefly ſought for the ſkin of its breaſt, and why; in breeding-time their breaſts are bare, iii. 262.

Greenfinch, bird of the ſparrow kind, iii. 197.

Greenland, Crantz's account of the formation of ice-mountains in that country, i. 144; *aurora borealis*, its appearance almoſt conſtant in winter; the inhabitants not entirely forſaken in the midſt of their tedious night; this *aurora* affording them light for the purpoſes of exiſtence, 222; they live moſtly upon ſeals; their number daily diminiſhing, and why, ii. 351.

Greenlanders, deſcribed, i. 346; cuſtomary among them to turn Europeans into ridicule; a quiet, or a modeſt ſtranger, they deem almoſt as well bred as a Greenlander, 348.

Grew, his opinion concerning dwarfs and giants, i. 370.

Greyhound kind, ii. 191; greyhound fox, 217.

Gris, the petit gris, Mr. Buffon's name for the grey Virginian ſquirrel, ii. 267.

Groſsbeak, bird of the ſparrow kind, iii. 197.

Grotto of Antiparos, in the Archipelago, the moſt remarkable ſubterraneous cavern now known; deſcription, i. 45.

Grotto del Cane, near Naples, ſituation and deſcription; noxious effects, i. 54.

Grous, chiefly found in heathy mountains and piny foreſts, iii. 138.

Growth of the child leſs every year, till the time of puberty, when it ſtarts of a ſudden; growth of the mind in children correſponds with that of the body, and why, i. 263; of ſome young people ceaſes at fourteen or fifteen; of others continues till two or three and twenty, 273; of fiſhes irregular and tardy, iii. 417.

Guadalquiver, river in Spain buried in the ſands, i. 132.

Guanacoes, a kind of camel in America, iii. 13.

Guanches, ancient inhabitants of the iſland of Teneriff; art of embalming ſtill preſerved among them, when the Spaniards conquered the iſland, i. 377, 378.

Guariba, Braſilian guariba, or warine, the largeſt of the monkey-kind in America, deſcribed, ii. 380.

Guayaquil, river in South America, i. 88.

Gudgeon, freſh-water ſort has no bladder, iii. 331; deſcription of that fiſh, 399.

Guiba, animal reſembling the gazelle; its deſcription, ii. 81.

Guillemot, bird of the ſmaller tribe of the penguin kind, iii. 292.

Guinea, the natives kill numbers of hares at a time, and in what manner, ii. 261.

Guinea-aſs, larger and more beautiful than the horſe, ii. 29.

Guinea-hen, deſcribed, iii. 135.

Guinea-horſe, remarkable ſports with it among the grandees of that country, ii. 17.

Guinea-pig, by Briſſon placed among the rabbit kind; native of the warmer climates; rendered domeſtic, and now become common every where; its deſcription; in ſome places a principal favourite; often diſplacing the lap-dog; manner of living among us; moſt helpleſs and inoffenſive, ſcarce poſſeſſed of any courage; their animoſity exerted againſt each other; often fight obſtinately, and the ſtronger deſtroys the weaker; no natural inſtinct, the female ſees her young deſtroyed without attempting to protect them; ſuffer themſelves to be devoured by cats; fed upon recent vegetables, they ſeldom drink; ſometimes gnaw clothes, paper, or other things of the kind; drink by lapping; confined in a room, ſeldom croſs the floor, but keep along the wall; never move abreaſt together; chiefly ſeek the moſt intricate retreats, and venture out only when all interruption is removed, like the rabbits; in cold weather more active; a very cleanly animal; their place muſt be regularly cleaned, and a new bed of hay provided for them once a week; the young falling into the dirt, or other ways diſcompoſed, the female takes an averſion to them, and never permits them to viſit her more; her employment, and that of the male, conſiſts in ſmoothing their ſkins, diſpoſing their hair, and improving its gloſs; and take this office by turns; do the ſame to their young, and bite them when refractory; reared without any artificial heat; no keeping them from fire in winter if once permitted to approach it; manner of ſleeping; the male and female watch one another by turns; generally capable of coupling at ſix weeks old; time of their geſtation; the female brings forth from three to five at a time; not without pain; the female admits the male the very day ſhe has brought forth, and again becomes pregnant; ſuckles her young about twelve or fifteen days, and ſuffers the young of others, though older, to drain her, to the diſadvantage of her own; produced with eyes open, and in twelve hours equal to the dam in agility; capable of feeding upon vegetables from the beginning; their diſputes for the warmeſt place, or moſt agreeable food; manner of fighting; fleſh indifferent food; difficultly tamed; ſuffer no approaches but of the perſon who breeds them; manner of eating; drink ſeldom, and make water often; grunt like a young pig; appear to chew the cud, ii. 283 to 287.

Guinea-ſheep, have a kind of dewlap under the chin; breed with other ſheep, therefore not animals of another kind, ii. 63.

Guiratemga, name given by the natives of Braſil, to the *little wood-pecker*, iii. 166.

Gull, places where found in plenty; their food, iii. 281.

Gulls, various ways of impoſing upon each other; conteſts in breeding; reſidence, with their neſts and eggs; their fleſh; method of taking them in the Feroe iſlands; anciently a law in Norway concerning thoſe who died in taking them, iii. 283 to 285.

Gulph, the Perſian; deadly wind along its coaſts, i. 206; chief pearl-fiſhery carried on there, iv. 63.

Gun, wind gun, inſtrument determining the elaſticity of the air; a ball from it pierces a thick board, i. 178; great guns, in climates near the equator, with every precaution, after ſome years become uſeleſs, and why, 18[illegible].

Gunpowder, readily fires with a ſpark, not with the flame, i. 53; will not go off in an exhauſted receiver; a train of gunpowder laid, one part in open air, the other part in vacuo, the latter will remain untouched, 192.

Gurnard, deſcription of this fiſh, iii. 400.

Guſtavus Adolphus attempted in vain to form a regiment of Laplanders, i. 347.

Guts, moſt birds have two blind guts, which in quadrupeds are found ſingle, iii. 43.

Gymnotus, the *carapo*, deſcription of this fiſh, iii. 402.

Gyr-falcon, exceeds all others in largeneſs of ſize; its deſcription, iii. 98.

Gyrle, name given hunters to the roebuck, the ſecond year, ii. 110.

H

Habit, contracted during life, to make out pleaſures and pains in extremes, though either can hardly be ſuffered or enjoyed to the utmoſt, i. 344.

Haddock, a periodical ſhoal appeared on the Yorkſhire coaſts, on December 10, 1766, and exactly on the ſame day in the following year, iii. 410.

Hæmorrhois, a kind of ſerpent, iv. 148.

Hail, Carteſians ſay, is a frozen cloud half-melted and frozen again in its deſcent; the moſt injurious meteor known in our climate; hail-ſtones fourteen inches round; ſtruck out an eye of a young man, and killed him on the ſpot; a dreadful ſhower recorded by Mezeray, fell in 1510; the hail-ſtones were of a blueiſh colour, and ſome weighed a hundred pounds; the fiſhes were general ſufferers in that great calamity, i. 214 to 216.

Hair of the Roman ladies praiſed for the redneſs of its ſhade, i. 271; found moſt different in different climates; marks the country and the diſpoſition of the man; by the ancients held a ſort of excrement, produced like the nails; according to moderns, every hair lives, receives nutriment, fills, and diſtends, like other parts of the body; takes colour from the juices flowing through it; each, viewed with a microſcope, conſiſts of five or ſix leſſer, wrapped up in one common covering, and ſends forth branches at the joints; ſuitable to the ſize or ſhape of the pore through which it iſſues; bulbous at the root, and its ends reſembles a bruſh; length and ſtrength of hair a mark of a good conſtitution; Americans and the Aſiatics have it thick, black, ſtraight, and ſhining; inhabitants of the torrid climates of Africa have it black, ſhort, and woolly; the people of Scandinavia have it red, long, and curled; opinion that every man has diſpoſitions reſembling thoſe of the inhabitants of countries he reſembles in the colour and nature of his hair; curled hair among us a beauty; the Greeks have taken one of their national diſtinctions from the length and ſtraightneſs of the hair; Americans take the greateſt pains in cutting their hair; variety in cuſtoms and manner of cutting hair, i. 277 to 283; trade of the inhabitants of Angora with the hair of animals of their country; camblet and the other ſtuffs made of it, ii. 68; hair of the cat rubbed in the dark, ſends forth ſhining ſparks, 150; Syria and Perſia noted for long ſoft hair to the animals bred in them, 153; each hair of the lynx of three different colours; of the black fox ſo diſpoſed as impoſſible to tell which way the grain lies, 217; coats of hair ſeem to thicken at the approach of winter; among quadrupeds, as among men, thin ſpair diet produces hair, 229; on the ſoles of the feet, and on the inſide of the mouths of hares, 258.

Halcyon, rapacious water-fowl, iii. 315. See *King fiſher*.

Halley, (*Dr.*) his plauſible theory to explain the invariable motion of the winds, i. 197, 198.

Hallontide, in 1580, an army of mice ſo over-run the marſhes near South-minſter, that they eat up the graſs to the roots, iii. 113.

Halos, oftener ſeen in countries near the poles, than any other part of the earth, i. 222.

Hammer, the yellow, bird of the ſparrow kind, iii. 197, 198.

Hamſter, the cricetus or German rat of Mr. Buffon, ii. 297.

Hand, ſufficient to vindicate the dominion of man, over other animals, a poor aſſertion ; a man, without hands or legs, converts his ſtumps to moſt convenient purpoſes, and performs aſtoniſhing feats of dexterity, ii. 388.

Harbour of a ſtag, in covert or thicket, ii. 98.

Hare, a gregarious animal, where it has no enemies but beaſts of the foreſts, ii. 37 ; the ſwifteſt animal for the time it continues to run, 254 ; animals of the hare-kind inoffenſive and timorous ; placed by Pyerius among thoſe that chew the cud ; whether or not, certainly the lips continually move ſleeping or waking ; that kind remarkably ſalacious, and furniſhed by nature with ampler powers than others for propagation ; if not thinned by conſtant depredations, would over-run the earth ; of theſe, the hare the largeſt and moſt timorous ; has large prominent eyes placed backwards to ſee behind as it runs ; theſe never cloſed ; it ſleeps with them open ; the ears moveable, and capable of direction to every quarter ; muſcles of its body ſtrong and without fat ; hinder feet longer than the fore on account of ſpeed ; perſecuted by dogs, cats, weaſels, and birds of prey ; in a ſtate of engendering very early ; females go with young thirty days, and bring forth three or four at a time ; has young of different ages in her womb together ; though already impregnated, ſhe admits the male, and receives a ſecond impregnation ; reaſon of this extraordinary circumſtance ; the young brought forth with their eyes open ; the dam ſuckles them twenty days ; food they are fond of ; ſleep or repoſe in their form by day, and live only by night ; the rutting ſeaſon begins in February ; the male purſues and diſcovers the female by the ſagacity of its noſe ; the ſlighteſt breeze, or falling of a leaf, diſturbs their revels ; they inſtantly fly off, each taking a ſeparate way ; are more eaſily taken than the fox, a much ſlower animal than they, and why ; always chooſe to run up a hill, and why ; have the ſole of the foot furniſhed with hair, and ſeem the only animals with hair on the inſide of the mouth ; live ſeven or eight years, and come to perfection in one year ; females live longer ; Mr. Buffon makes a doubt of it ; ſeldom heard to cry, except when ſeized or wounded ; they cry nearly alike the ſqualling of a child ; are eaſily tamed ; though never ſo young, regain their native freedom at the firſt opportunity ; have a good ear, and been taught to beat the drum, dance to meaſure, and go through the manual exerciſe ; make themſelves a form where the colour of the graſs reſembles that of their ſkin, open to the ſouth in winter, and to the north in ſummer ; ſore hunted, will ſtart a freſh hare and ſquat in its form ; ſome enter holes like the rabbit, by hunters termed going to vault ; as it tires, treads heavier, and its ſcent is ſtronger ; young hares tread heavier than old ; male makes doublings of greater compaſs than the female ; divided by hunters into mountain and meaſled hares ; mode of expreſſion, the more you hunt, the more hares you ſhall have, and why ; what animals perſecute the hare ; its enemies ſo various, that it ſeldom reaches the ſhort term limited to it by Nature ; in countries near the north pole, they become white, and are often in great troops of four or five hundred ; their ſkins ſold for leſs than ſeven ſhillings a hundred ; the fur known to form a conſiderable article in the hat manufacture ; found alſo entirely black, in much leſs quantity than the former ; ſome have been ſeen with horns, but rarely ; thoſe in hot countries ſmaller than ours ; thoſe in Milaneſe the beſt in Europe ; ſcarce a country where not found from the torrid zone to the polar circle ; natives of Guinea kill numbers at a time ; in what manner ; the Jews, ancient Britons, and Mahometans all conſidered it as an unclean animal, and religiouſly abſtained from it ; hare and rabbit diſtinct kinds, refuſe to mix with each other, an inſtance ; Apicius ſhews the manner of dreſſing a hare in true Roman taſte ; laws made for the preſervation of them, 255 to 262.

Harfang, or great Hudſon's Bay owl, the largeſt of the nocturnal tribe, iii. 110.

Harlequin, a kind of a dog, ii. 192, 194.

Harmony of our planetary ſyſtem, i. 11.

Harold. See *Hawk*, iii. 97.

Harp, the ſtory of Arion's gathering the dolphins about the ſhip, i. 322.

Harpies, that ancient idea taken from the rouſette, or the great bat of Madagaſcar, ii. 330.

Harrier, hound, and beagle, all of the ſame kind, ii. 191; a dog of the generous kind, 192.

Hart, name of the ſtag the ſixth year, ii. 98.

Hartſhorn, and muſk, the only medicines of reputation of ſeveral procurable from quadrupeds, ii. 74.

Harvey, his opinion about the formation of the incipient animal; altercations againſt his ſyſtem, i. 239.

Hatching, nothing exceeds the patience of birds hatching, iii. 48; Mr. Addiſon's obſervations to this purpoſe, 49; the emu very peculiar in the hatching of its young, 70; the crocodile's eggs hatched in the ſand, iv. 104.

Hatfield, in Yorkſhire, deſcription of one of thoſe ſpouts called typhons, obſerved there in 1687, i. 226.

Havannah, in the fortunate expedition which gave us that place, the climate left not a fifth part of the army ſurvivors of the victory, i. 186.

Hawfinch, a birds of the ſparrow kind, iii. 198.

Hawk-kind, deſtroys mice, ii. 292; perceives a lark at a diſtance which neither men nor dogs could ſpy, iii. 40; diſtinctive marks from other carnivorous birds, 80; in old paintings, the criterion of nobility; no perſon of rank ſtirred without his hawk on his hand; Harold afterwards king of England, going on an important embaſſy into Normandy, is drawn in an old bas-relief, embarking with a hawk on his fiſt, and a dog under his arm; in thoſe days, it was ſufficient for noblemen's ſons to wind the horn and carry the hawk fair; this diverſion in ſuch high eſteem among the great all over Europe, that Frederick, Emperor of Germany, wrote a treatiſe upon hawking; this amuſement now much given over in this kingdom, and why; in the reign of James I. Sir Thomas Monſon gave a thouſand pounds for a caſt of hawks; in the reign of Edward III. it was made felony to ſteal a hawk; to take its eggs was puniſhed by impriſonment for a year and day, with a fine at the king's pleaſure; in the reign of Elizabeth, the impriſonment reduced to three months, the offender to lie in priſon till he got ſecurity for his good behaviour during ſeven years; in earlier times, the art of gunning was but little uſed, and the hawk was then valuable for its affording diverſion and procuring delicacies for the table not otherwiſe to be obtained; diſtinctive marks of the tribe called the long-winged hawks; their names and deſcription; have attachment to their feeder, and docility the baſer race are ſtrangers to; names of hawks of the baſer race; thoſe of the generous breed remarkable for courage, ſwiftneſs, and docility, in obeying the commands and the ſigns of their maſter; account of the manner of training a hawk; falconers had a language peculiar, in which they converſed and wrote, 97 to 100.

Hawk, (ſparrow) purſues the thruſh and the linnet, iii. 78; ſaid to be the boldeſt and beſt of all others for the chaſe, 104.

Hawk, (goſs) and ſparrow-hawk unfit for training; taught to fly at game, but little obtained from them, iii. 104.

Hawkins, (Sir Robert.) See *Azores*, i. 140.

Head of man externally and internally different from that of all other animals, the monkey-kind excepted, i. 285; whence originally the flat heads of the American Indians, 360; of quadrupeds different from other, but adapted to their ſeveral ways of living, and how, 401; in all birds, except nocturnal, the head ſmaller and leſs proportioned to the body than in quadrupeds, iii. 39; of the great Greenland whale makes a third of its bulk, 341.

Hearing, extreme delicacy of this ſenſe in birds, iii. 40; that ſenſe in whales, 342.

Hearſe, name of the female of the ſtag, the ſecond year, ii. 98.

Heart, a broken heart, in common language, a diſorder cauſed by hunger, i. 300.

Heat, Boerhaave conſidered it ſo prejudicial to health, that he never went near a fire, i. 188; of the blood in man and other animals about thirty degrees above congelation; in the marmout, and other animals, which ſleep the winter, it is not above ten, ii. 278.

Hecla, the bellowings of that volcano, believed by the inhabitants of Iceland to be the cries of the damned, i. 56.

Hedge-hog, the moſt harmleſs of animals; its deſcription; uſual appearance upon the approach of danger; to diſguſt its enemy from purſuit, ſheds its urine, the ſmell of which is ſufficient to ſend him off; ſleeps by day, and ventures out by night; places where found; its food; does not ſuck cattle; are not hurtful in gardens or orchards; the ſpines ſo diſpoſed, that no fruit will ſtick upon them; appears ſerviceable in ridding the field of inſects and worms; Mr. Buffon accuſes it of tricks, of which, from its form and habits, one would not be led to ſuſpect it; he kept males and females together, but they never coupled; time of their coupling; ſleep during winter, but do not lay up proviſions for that ſeaſon; at no time eat much, and remain long without food; blood cold, and their fleſh not good for food; their ſkins converted to no uſe, except to muzzle calves from ſucking, ii. 308 to 310; deſtroyed and devoured by the fox; in what manner, 214, 319.

Hedge-hog of the ſea, a cartilaginous fiſh of the ſea-orb kind, iii. 392.

Hedge-ſparrow, a ſlender billed bird, iii. 196.

Height, Maximin, the Emperor, above nine feet in ſtature, i. 294.

Heliogabalus, noted for having the brains of ſix hundred oſtriches dreſſed in one diſh, iii. 66.

Hellebore, a quantity of the black ſort pounded careleſsly purged ſeveral perſons who were preſent, and the operator ſtrongly, i. 189.

Helmo's (St.) fire, or the mariner's light, i. 218.

Helmont, his experiment to ſhow all things made of water, i. 99.

Hemiſphere, half illuminated by northern lights, i. 217.

Hemlock, eat by the horſe without injury, ii. 5.

Hemuſe, name hunters give the roebuck the third year, ii. 110.

Hen, in the Muſeum at Bruſſels, a creature covered with feathers and hair; ſaid to be bred between a rabbit and a hen, ii. 262.

Hen of the common ſort, moderately fed, lays above a hundred eggs from ſpring to autumn, iii. 51; after three years become effete and barren; clutches one brood of chickens in a ſeaſon; inſtances of two, very rare; number of eggs of a domeſtic hen in the year above two hundred, being well fed, ſupplied with water, and at liberty; trodden by the cock or not, ſhe continues to lay; eggs of this kind never by hatching produce living animals; her neſt made without care; clucking ſeaſon artificially protracted, and entirely removed, in what manner; left to herſelf, would ſeldom lay above twenty eggs without attempting to hatch them; as ſhe lays, her eggs being removed, ſhe continues to increaſe the number; in the wild ſtate, ſeldom lays above fifteen eggs; particularities of incubation; affection and pride after producing chickens; every invading animal ſhe boldly attacks, the horſe, the hog, or the maſtiff; marching before her little troop, by a variety of notes calls her train to their food, or warns them of danger; inſtance of the brood running for ſecurity into a hedge, while the hen ſtood boldly forth, and faced a fox that came for plunder; artificial method of hatching chickens in ſtoves, practiſed at Grand Cairo, or in a laboratory with graduated heat, effected with woollen hens, by Mr. Reaumur; by theſe contrivances, from a hen naturally producing twelve chickens in the year, are obtained artificially above two hundred, 121 to 123; common hen ſupplies the place of the hen-pheaſant, when refuſing to hatch her eggs, and performs the taſk with perſeverance and ſucceſs, 133.

Hen, (Guinea) or *Barbary hen*, deſcribed, iii. 135.

Hen, (water) deſcribed, reſidence and food; neſt and habits, iii. 260 to 261.

Henry IV. King of Denmark, deſirous of trying the ſkill of a muſician, who boaſted he could excite men to madneſs, ſubmitted to the operation, became mad, and killed four of his attendants, i. 323.

Herculaneum overwhelmed in that eruption of Veſuvius in which Pliny the naturaliſt was ſuffocated; its ruins lately diſcovered at ſixty feet below the ſurface, and forty below the bottom of the ſea, i. 58.

Hermaphrodites, ſuch are all animals of the ſnail kind, iv. 49; the bivalve tribe are ſo too; they require no aſſiſtance from each other towards impregnation, 54, 55.

Hermetical ſealing a glaſs veſſel, the meaning of it, i. 100.

Heron, a ruminating bird, ii. 39; the great heron, in former times, bred familiarly in our marſhes; not now, and why, iii. 52; anatomical diſtinction in which herons differ from other birds; of this tribe Briſſon has enumerated forty-ſeven ſorts; exceſſively deſtructive and voracious; ever have lean and carrion bodies; deſcription of the common heron; flies at the approach of the ſparrow-hawk; commits the greateſt devaſtations in freſh waters; a fiſh ever ſo large he will ſtrike at, though unable to carry it away; one heron, ſays Willoughby, will deſtroy fifteen thouſand carp in half a year; uſual attitude, waiting for prey; food in cold and ſtormy ſeaſons; manner of fiſhing; Willoughby's receipt for taking them; their neſts; never in flocks when they fiſh, but making neſts, they love each other's ſociety; fleſh of the young eſteemed in France; method uſed to obtain them; the young once excluded, the old inceſſantly provide them with an amazing quantity of fiſh; inſtance of it; by Mr. Keyſler's account, this bird may exceed ſixty years; recent inſtance of one taken in Holland, with a ſilver plate to one leg, and an inſcription, that it had been ſtruck by the Elector of Cologne's hawks thirty-five years before, they contract a conſumptive diſpoſition, 237 to 240.

Heron-hawking, a favourite diverſion among our anceſtors, had laws enacted for the preſervation of the ſpecies; he who deſtroyed their eggs was liable to a penalty of twenty ſhillings for each offence, iii. 238.

Herrera confirms the exiſtence of giants, i. 372.

Herring, its deſcription, iii. 403; of migrating fiſh, this and the pilchard take the moſt adventurous voyages; places where the herrings are in the greateſt abundance; numerous enemies met in their migrations; in Cheſepeak bay, the ſhoals ſo great as to cover the ſhores, and become a nuiſance; that body upon our coaſts begins to appear off the Shetland iſles in April; fore-runners the grand ſhoal deſcending in June, and announced by the gannet, gull, &c.; fiſhermen take two thouſand barrels at a ſingle draught; places of Europe where herrings are punctual in their viſitations; doubts in every part of their migration; firſt great bank for herrings was along the Norway ſhore; before 1584, the number of ſhips from various parts of Europe reſorting thither, exceeded ſome thouſands; quantity of herrings then aſſembled there, was ſuch that a ſpear ſtuck in the water, as Olaus Magnus aſſerts, would ſtand on end; ſoon after that period, they deſerted the Norway ſhores, and took up along the German coaſts; no cauſe aſſigned for this ſeemingly capricious deſertion; their greateſt colonies now in the Britiſh channel, and upon the Iriſh ſhores; a herring ſuffered to multiply unmoleſted, and undiminiſhed for twenty years, would ſhew a progeny greater in bulk than ten ſuch globes as that we live upon, 410 to 415.

Hertfordſhire, a dreadful ſtorm which happened in it, in 1697, deſcribed, i. 215.

Hexagons, with Pappus, the moſt convenient figures in building; cells of bees are perfect hexagons, iv, 261.

Hide of the elk, often known to turn a muſquet ball, ii. 116.

Hiera, iſland in the Mediterranean, riſen and formed by ſubterraneous exploſions, i. 77.

Hiero. See *Archimedes*, i. 112.

Hind, or female of the ſtag, has no horns; time of geſtation, and uſual ſeaſon of bringing forth; hides her young in obſcure thickets; obliged to uſe all arts to conceal them from the ſtag, the moſt dangerous of her purſuers; how ſhe defends her young, ii. 95; the female ſtag ſtill ſo called, the third year, 98; manner of knowing the track of a hind, 99; inhabitants of Canada have no other milk but that of the hind; and no other cheeſe but that made of it, 104; the hunters name for the roebuck, the firſt year, 110.

Hippocampus, the *ſea horſe*, its deſcription, iii. 391.

Hippocrates, his opinion about the formation of the incipient animal, i. 239.

Hippopotamus, not afraid ſingly to oppoſe the lion, ii. 160; its dimenſions; places where it reſides; its food; ſwims with much force, and remains at the bottom for thirty or forty minutes; it commits dreadful havock among the plantations; method the Africans uſe to frighten it back to its element; inoffenſive in arts and diſpoſition; never attacks mariners in their boats, unleſs inadvertently ſtruck againſt, or otherwiſe diſturbed, then it would ſend them at once to the bottom; inſtances of its great ſtrength, never goes beyond the mouth of freſh water rivers; attacked on ſhore, and incapable of vengeance upon a flying enemy, returns to the river, and plunges in head foremoſt; the negroes, appriſed of its force, do not engage it; continues uncontrouled maſter of the river, all others fly its approach, or become an eaſy prey; moves ſlowly upon land; ſeldom goes from the river ſide, unleſs preſſed by neceſſities of hunger, or of bringing forth its young; lives upon fiſh and vegetables; natives of Africa ſay it often devours children, and other creatures ſurpriſed upon land; the young are excellent eating; the female ſeldom produces above one at a time; hearing the ſlighteſt noiſe, ſhe daſhes into the ſtream, and the young one follows her with equal alacrity; Dr. Pococke has ſeen their fleſh ſold in ſhambles like beef; their breaſt thought as delicate eating as veal; this creature, once plenty at the mouth of the Nile, now wholly unknown in Lower Egypt, and no where found but above the cataracts, 410 to 412.

Hiſtorian, (natural) what his proper buſineſs, i. 12; going too much into ſpeculation certainly wrong, and why, 19; method his principal help, 387; faults of ſyſtematic writers, 388.

Hiſtory, (natural) of all other ſciences has the leaſt danger of obſcurity, and why, i. 393; beſt ſet forth, as Mr. Locke has obſerved, by drawings of animals, taken from life, 397; rule in natural hiſtory, that neither horns, colour, fineneſs, or length of hair, or poſition of ears make actual diſtinctions in the kinds, ii. 69; accounts of fiſhes little entertaining; philoſophers not ſtudying their nature, but employed in increaſing their catalogues, iii. 320; Dampier has added more to it than half the philoſophers before him, iv. 28; one of the ſtrangeſt diſcoveries in all natural hiſtory, 305.

Hobby, bird of the generous breed of hawks, for ſmaller game, daring larks, and ſtooping at quails, iii. 99.

Hogs, animals of this kind reſemble thoſe of the horſe as well as the cow kind, and in what; this kind partakes of the rapacious and the peaceful kinds; offends no animal of the foreſt; remarkable that none of this kind ever ſhed their teeth; any animal dying in the foreſt, or ſo wounded as to make no reſiſtance, is the prey of the hog, who refuſes no animal food, however putrid; in a ſtate of wildneſs, moſt delicate in the choice of its vegetables, rejects a greater number than any other; they eat but ſeventy-two plants, and reject a hundred and ſeventy; indelicacy of this animal more in our apprehenſions than in its nature, and why; in orchards of peach-trees in North America, reject the fruit that has lain a few hours on the ground, and watch hours for a freſh wind-fall; have had mice burrowing in their backs while fattening in the ſty, without ſeeming to perceive it; ſcent the hounds at a diſtance; by nature ſtupid, inactive, and drowſy, has paſſions more active only when incited by venery, or when the wind blows with vehemence; foreſees the approach of bad weather; much agitated on hearing any of its kind in diſtreſs; have often gathered round a dog that teazed them, and killed him upon the ſpot; their various diſeaſes; generally live, when permitted, to eighteen or twenty years; the females produce to the age of fifteen; in the wild ſtate leſs prolific, ii. 130 to 135.

Hog, (Guinea) and that about Upſal deſcribed, ii. 136.

Hog, (water.) See *Capibara*, ii. 141.

Hog of Borneo. See *Babyroueſſa*, ii. 142.

Hog of the iſthmus of Darien, deſcribed by Wafer, ii. 144.

Hoanho, a river in Aſia; its courſe, i. 124; receives thirty-five leſſer rivers, 128.

Holland, a conqueſt from the ſea, and reſcued from its boſom; the ſurface of its earth below the level of the bottom of the ſea; upon approaching the coaſt, it is looked down upon from the ſea, as into a valley, is every day riſing higher, and by what means; thoſe parts which formerly admitted large men of war, are now too ſhallow to receive ſhips of moderate burthen, i. 160, 161.

Honey, the polecat and the martin feed upon honey, ii. 231; from what part of of the flower it is extracted, iv. 263; two kinds of it; which to be preferred, 271; that gathered by the humble bee, 272; gathered by the black bees in the tropical climates, neither ſo unpalatable, nor ſo ſurfeiting as ours; produced by the bees at Guadaloupe, 271 to 273. See *Bees* 272, 273.

Honeycomb, name of the ſecond ſtomach of ruminating animals, ii. 38.

Hoof of the Perſian mares, ſo hard, that ſhoeing is unneceſſary, ii. 13.

Hooper, name of the wild ſwan, on account of the harſhneſs of its voice, iii. 300.

Horizon, ſeems wrapt in a muddy cloud, upon the approach of winter, under the line, i. 217.

Horn, to wind it, and to carry the hawk fair, formerly ſufficient accompliſhments for noblemen's ſons, iii. 97.

Horns, in what manner thoſe of animals are produced, i. 285; grow differently in deer from thoſe of ſheep or cows; deers' horns furrowed along the ſides, and why; in every reſpect reſembling a vegetable ſubſtance, grafted upon the head of the ſtag; beauty and ſize of thoſe of a ſtag, mark their ſtrength and their vigour; the time of ſhedding them; ſevere winters retard the ſhedding the horns in ſtags; generally increaſe in thickneſs and height from the ſecond year to the eighth; partake of the nature of the ſoil; their horns ſhed, they ſeek the plainer part of the country, remote from thoſe animals they are then unable to oppoſe; and walk with their heads ſtooping down, to prevent ſtriking againſt the branches of a tree, ii. 89 to 91; of a ſtag, called his head; their names according to different ages of the ſtag, 98; the author ſaw one of ten feet nine inches, from one tip to the other, 113; of the of the elk applied to the ſame purpoſes as hartſhorn, 117; rein-deer converted into glue; of the rhinoceros, ſometimes from three to three feet and a half long, compoſed of the moſt ſolid ſubſtance, and pointed to inflict moſt fatal wounds, 407; of owls nothing more than two or three feathers that ſtand up on each ſide of the head, over the ear, iii. 109.

Horſes, characteriſtic marks given by Linnæus; eats hemlock without injury, ii. 5; near as the ape approaches man in external conformation, ſo the horſe is the moſt remote; wild horſes herd together, and feed in droves of five or ſix hundred; one among their number always ſtands a centinel, 6; there are but three animals of the horſe kind, 31; a horſe will not carry upon its back, a weight of more than two or three hundred pounds, i. 291; to eſtimate the ſtrength of a horſe, is not to try what he can carry, but what he can draw; he draws a load ten men cannot move; and in ſome caſes a draft-horſe draws better being ſomewhat loaded, 292; allured by muſic, 322; not readily attacked by the lion; the combats between them in Italy, 403; one fond of oyſters, 408; from what country the horſe came originally uncertain; according to the ancients, wild horſes once in Europe; the colder climates do not agree with them; how wild horſes are caught; ſet at liberty they never become wild again; the Buccaneers agreebly ſurpriſed to ſee their faithful horſes preſent themſelves again with their uſual aſſiduity, and receive the reign; this animal in the ſtate of nature in the old, not the new world, ii. 7; wild horſes finding a tame horſe to aſſociate with them, gather round him, and oblige him to ſeek ſafety by flight; countries where wild horſes are found; the natives of Angola, or Cafraria, catch the horſe only to eat him; *Arabian wild horſes*, the moſt beautiful breed, the moſt generous, ſwift and perſevering; the negroes ſhew terror and ſurpriſe, when firſt they ſee a horſe, 8; no Arabian, however poor, but has his horſe; tame Arabian horſes, ſome valued at a thouſand ducats, 9; different claſſes among the Arabians; they know the race of a horſe by his appearance; Arabians preſerve the pedigree of their horſes with care, for ſeveral ages, 10; countries into which the race of their horſes has ſpread itſelf, 12; they take the wild horſes with traps; the young horſe conſidered by them as a great delicacy; they feaſt upon him while any part is remaining; the uſual manner of trying the ſwiftneſs of Arabian horſes, by hunting the oſtrich; and a horſe of the firſt ſpeed is able to out-run it, 9; treat their horſes gently; hold a diſcourſe with them; written atteſtations given to perſons who buy Arabian horſes; they ſtand ſtock ſtill in the midſt of their career, the rider happening to fall; keep them ſaddled at their tents from morning to night, to prevent ſurpriſe; when the Arabians begin to break their horſes; how the Arabians dreſs and feed their horſes, 11; firſt began the management of horſes in the time of ſheque Iſmael; the rapidity of the flight of Arabian horſes is ſuch that the dogs give up the purſuit, 9; upon computation, the ſpeed of the Engliſh horſes is one fourth greater carrying a rider, than that of the ſwifteſt barb without one; Numidian race much degenerated; the Tingitanians and Egyptians have the fame of rearing the fineſt horſes, for ſize and beauty, 13; horſes of Barbary; an Italian peculiar ſport, in which horſes of this breed run againſt each other, 12; Spaniſh genette deſcribed, 13; thoſe of Andaluſia paſs for the beſt, and preferred as war horſes to every other country; Italian horſes have a particular aptitude to prance, 14; the horſes of *India*, weak and waſhy; fed with peas, ſugar and butter; one brought to England not much larger than a common maſtiff; climates exceſſively hot ſeem unfavourable to horſes; remarkable ſports on horſeback, the horſes of the Gold Coaſt and Guinea extremely little, but very manageable; of *China*, weak, little, ill-ſhaped, and cowardly; thoſe of *Corea* timorous, as not to be ſerviceable in war, 17, 18; *Tartar* horſes very ſerviceable in war; they were proprely the conquerors of China; march two or three days without ſtopping; continue five or ſix, without eating more than a handful of graſs at every eight hours; and remain without drinking four and twenty hours; loſe all their ſtrength when brought into China or the Indies; thrive pretty well in Perſia and Turkey; ancient opinions on the nature and qualities of the horſes of Theſſaly, Achaia, Ethiopia, Arabia, Afric, Italy and particularly of Apulia, of Sicily, Capadocia, Syria, Armenia, Media, Perſia of Sardinia, and Corſica; of Spain, Walachia, Tranſylvania, of Denmark, Scandinavia, Flanders, of the Gauliſh horſes, of the German, Swiſs, Hungarian, and laſtly of the Engliſh horſes, 18, 19; *Daniſh* horſes of ſuch excellent ſize and ſtrong make, that they are preferred to all others for draught; ſome ſtreaked like the tiger, or mottled like the leopard; *German* and *Hungarian* horſes; *Dutch* horſes are good for draught; the beſt come from the province of Friezland; the *Flanders* horſes, 14; few *French* horſes good; in general are heavy ſhouldered; the beſt of that country come from Limoſin, and Normandy furniſhes the next; *American* tame horſes admirable; method of hunting with them, 15; iſlands of the Archipelago have very good horſes; thoſe of Crete were in great reputation among the ancients, at preſent uſed in the country itſelf, becauſe of the unevenneſs of the ground; the original horſes of *Morocco*, ſmaller than the Arabian breed; in Turkey there are horſes of all races; *Perſian* horſes, in general, the moſt beautiful and moſt valuable of all the eaſt, 16; ſome greatly eſteemed in the Ukraine, in Walachia, Poland, Sweden, 18; *Engliſh* horſes excel the Arabian in ſize and ſwiftneſs; are more durable than the barb, and more hardy than the Perſian; one inſtance of their great rapidity, in the admirable Childers, frequently known to move eighty-two feet and a half in a ſecond, 19; fault of our manner of breaking horſes; the French managed horſe never falls before, but more uſually on one ſide; the Engliſh are for ſpeed and deſpatch, the French, and other nations, are more for parade and ſpirit; Engliſh hunters conſidered the nobleſt and the moſt uſeful horſes in the world, 20; Roger de Belegme, the firſt recorded to have attempted mending our native breed; number of horſes in London in the reign of King Stephen, ſaid to have amounted twenty thouſand; in the times of Queen Elizabeth, the kingdom could not ſupply two thouſand horſes to form the cavalry; Powiſland, in Wales, for many ages famous for a ſwift and a generous race of horſes, and why, 21; perfections which a horſe ought to have, according to Camerarius, 22; a ruminating animal, ii. 39; in a courſe of years impoveriſh the ground, 42; the horſe and the aſs differ not ſo much in form as the cow and the biſon, yet the former are diſtinct animals, and the latter animals of the ſame kind, 45; eats two hundred and ſixty-two plants, and rejects two hundred and twelve, 133; famiſhed horſes more hairy than thoſe fed plentifully, 229; for hunting lions, muſt be of that ſort called charoſſi; all others fly at the ſight of the lion, 160; are killed by wild aſſes, 26; deſtroyed by the American bat, called vampyre, in South America, 332.

Horſe (Sea), deſcribed, iii. 391.

Hortenſius, the orator, the firſt who had peacocks ſerved up at an entertainment in Rome, iii. 125.

Hoſpitals, erected in India for the maintenance of all kinds of vermin, i. 352; for monkeys, erected by the Bramins, ii. 379.

Hottentots, outſtrip lions in the chaſe, as travellers report, i. 292; make much and very extraordinary uſe of the biſon, ii. 49.

Hound, *harrier*, and *beagle*, all of the ſame kind; *grey matin hound*, tranſported to the North, becomes a great Daniſh dog, and this ſent into the South, becomes a greyhound of different ſizes; the ſame tranſported into Ireland, the Ukraine, Tartary, Epirus, and Albania, becomes the great wolf-dog known by the name of the *Iriſh wolf-dog*; the *blood-hound*, a dog of the generous kind; and likewiſe the *gaze-hound*, and the *greyhound*; the blood-hound a dog of great uſe, and in high eſteem among our anceſtors; its employ; the gaze-hound, hunted, like our greyhound, by the eye, not by the ſcent, ii. 191 to 193; *Greyhound-fox*, the largeſt, talleſt, and boldeſt of the kind, ii. 217.

Howlet, a kind of owl without horns, iii. 109.

Hudſon's Bay, above twelve thouſand martins' ſkins annually imported from thence into England, ii. 238.

Huers, name given to the men employed to give ſignals where to extend the nets in the pilchard-fiſhery, iii. 413.

Hughes. See *Polypus*, iv. 323.

Hull, had the honour of firſt attempting that profitable branch of trade, the whale-fiſhery, iii. 347.

Humber, a new iſland formed at the mouth of this river; it is about nine miles in circumference, and worth to the proprietor about eight hundred pounds a-year, i. 80.

Humming-bird, is the ſmalleſt of birds, and ſeems nearly allied to the inſect, iii. 56; belongs to the ſparrow kind, 196; the ſmalleſt of them about the ſize of a hazel-nut; its deſcription; the larger humming-bird is near half as big as the common wren; its deſcription; are ſeen fluttering about the flowers, without ever lighting upon them; their wings in ſuch rapid motion, it is impoſſible to diſcern their colours, except by their glittering; but only extracting the honey as with a kiſs; their neſts and the number of eggs; their time of incubation; inſtance of their docility; countries where found; in the Leeward Iſlands, they continue in a torpid ſtate during the ſeverity of winter; Labat aſſerts, that, beſides the humming noiſe produced by the wings, they have a pleaſing melancholy melody in their voices, ſmall and proportioned to their organs; the Indians made uſe of this pretty bird's plumage; in what manner the children take them; when taken, they are inſtantly killed, and hung up in the chimney to dry; ſome dry them in ſtoves; at preſent the bird is taken rather for ſelling as a curioſity to Europeans than an ornament for themſelves, iii. 218 to 221.

Hump, of the biſon of different ſizes, weighing from forty to fifty pounds, ſometimes leſs; cuts and taſtes like a dreſſed udder; in a few generations it wears away, ii. 49, 50.

Hunger, every animal endures the wants of ſleep and hunger with leſs injury to health than man; hunger kills man ſooner than watchfulneſs; more dreadful in its approaches than continuance; dreadful effects of hunger, related to the author, by the captain of a ſhip, who was one of ſix that endured it in its extremities; different opinions concerning the cauſe of hunger; few inſtances of men dying, except at ſea, of abſolute hunger; thoſe men whoſe every day may be conſidered as a happy eſcape from famine, at laſt die of a diſorder cauſed by hunger; the number of ſuch as die in London of hunger ſuppoſed not leſs than two thouſand in a year; method of palliating hunger among the American Indians, i. 297 to 302; inſtances of amazing patience in hunger, 348.

Hunters, the Engliſh conſidered as the nobleſt and moſt uſeful horſes in the world, ii. 20; terms uſed by hunters in purſuing the ſtag; names invented by them for the ſtag, 98; for the fallow-deer, 106.

Hunting, the natural rights of hunting made royal, and when, ii. 96; the ſtag and the buck performed in the ſame manner in England, and how, 97, to 99; ancient manner of hunting the ſtag, 101; the manner in Sicily, and in China, 101; the wolf, 209; wolves uſed in hunting, 211; hunting of the fox, 214, 215; hunting the ſable chiefly the lot of the exiles in Siberia, 240; the ouran-outang, or wild man in Borneo, a favourite amuſement of the king, 361; of the elephant at the Cape of Good Hope, 404; the method uſed to take it alive, 399, 400; manner of hunting the oſtrich by the Arabians, and by the Struthophagi, iii. 67; manner of hunting the turkey, 128.

Hurco (Aufidius), charged by Pliny, with being the firſt who fatted peacocks for the feaſts of the luxurious, iii. 125.

Hurricane, the cloud preceding a hurricane, called by ſailors *bull's eye*, deſcribed; houſes, made of timber, bend to the blaſt of the hurricane like oſiers, and recover their rectitude; hurricanes offenſive to the ſenſe of ſmelling; maggots brought with them, i. 207; common in all tropical climates; on the coaſts of Guinea frequently three or four in a day; their ſeaſons upon thoſe coaſts, at Loango and the oppoſite coaſt of Africa; the hurricane called tornado, its dreadful effects, 208.

Hus, in Greek, ſignifies a ſow, and *huoina* derives from it, ii. 222.

Huſo, the iſinglaſs fiſh, caught in great quantities in the Danube, from October to January; furniſhes the commodity called iſinglaſs; often above four hundred pounds weight; its fleſh ſalted is better taſted, and turned red like ſalmon, ii. 387.

Hyæna, no words give an idea adequate to this animal's figure, deformity, and fierceneſs; more ſavage and untameable than any quadruped; its deſcription; defends itſelf againſt the lion, is a match for the panther, and attacks the ounce, which it ſeldom fails to conquer; an obſcene and ſolitary animal; its firſt howl ſometimes miſtaken for the voice of a man moaning; its latter like the violent efforts of reaching; whence it firſt took its name; native of the torrid zone, reſides in the caverns of mountains, the clefts of rocks, or dens it has formed under earth; taken ever ſo young, it never can be tamed; ſometimes attacks man, and carries off cattle; its eyes ſhine by night, and it is aſſerted that it ſees better by night than by day; ſcrapes up graves, and devours dead bodies, how putrid ſoever; abſurdities of the ancients about this animal, ii. 222, to 224.

I

Jabiru and *jabiru-guacu*, birds of the crane kind, natives of Braſil; their deſcriptions iii. 235.

Jackals, hunt in a pack, and encourage each other by mutual cries; what has given riſe to the report of its being the lion's provider, i. 405; travellers have miſtaken the jackal for the fox; one of the commoneſt wild animals in the Eaſt, yet ſcarce any leſs known in Europe, or leſs diſtinctly deſcribed by natural hiſtorians; its deſcription; its cry a lamentation reſembling that of human diſtreſs; is more noiſy in its purſuits than a dog, more voracious than the wolf; never goes alone, but always in a pack of forty or fifty together; ſeems little afraid of man; purſues its game to the doors, without apprehenſion; enters inſolently into ſheep folds, yards, and ſtables, and finding nothing elſe, devours leather harneſſes, boots and ſhoes; ſcratches up new-made graves, and devours the corpſe, how putrid ſoever; the corpſe how dug up; follows armies, and keeps in the rear of caravans; the moſt putrid ſubſtances it greedily devours; hides in holes by day, and appears abroad at night-fall; hunts by the ſcent; irreconcileable antipathy between it and the dog; no wonder it be voracious, and why; is as ſtupid as impudent; inſtances of it; Indian peaſants often chaſe it as we do foxes, ii. 218 to 220.

Jackdaw, its deſcription, iii. 153; rings found in the neſt of a tame jackdaw, 149.

Jacobines, a kind of pigeons, iii. 186.

Jaculus, the ſwifteſt ſerpent, its manner of progreſſion by coiling, iv. 130.

Jaguar, or the panther of America, ii. 174.

James, the hermit, ſaid to have lived a hundred and four years, i. 302.

Japaneſe, deſcription of that people, i. 351.

Jaw, the upper, thought by many quite immoveable; that it moves in man, an eaſy experiment will evince; has its proper muſcles behind the head for thus raiſing and depreſſing it; the under jaw in the embryo much advanced before the upper and in the adult, it hangs more backward; and in a Chineſe face it falls ſtill more backward than with us, the difference is thought half an inch, the mouth being ſhut naturally; M'Laurin, a profeſſor at Edinburgh, was ſubject to have his jaw diſlocated; the under-jaw has often an involuntary quivering motion; and often a ſtate of langour produces another, that of yawning, a very ſympathetic kind of languid motion; ridiculous inſtance of this ſympathetic affection commonly practiſed upon the ſame famous M'Laurin, 279, 280.

Jay, one of the moſt beautiful of the Britiſh birds; its deſcription; feeds upon fruits, kills ſmall birds, and is extremely docile, iii. 159; lays its eggs in the holes deſerted by the woodpecker, 165.

Ibex, a native of the Alps, the Pyrenees, and the mountains of Greece; its deſcription, ii. 70, 71.

Ibis, the Egyptians paid divine honours to this bird; different opinions concerning the ancient and modern ibis; Maillet's obſervation to this purpoſe; the true ibis thought a bird of the vulture kind, called by ſome the capon of Pharaoh, iii. 232, 233.

Ice, very elaſtic, i. 107; floats of it diffuſed into plains of above two hundred leagues in length; and mountains of it riſing amidſt them; flat ice and mountain ice, 142; their formation; mountains of it preſenting the reſemblance of a glory, 143.

Ichneumon, by ſome injudiciouſly denominated the cat of Pharaoh, one of the boldeſt and moſt uſeful animals of the weaſel kind; uſed in Egypt for the ſame purpoſes as cats in Europe; deſcription; diſcovers and deſtroys the eggs of the crocodile; ſerpents its moſt natural food; grows faſt and dies ſoon; eaſily ſtrangles a cat ſtronger and larger than itſelf; countries where found; attacks every living thing it is able to overcome, and fears not the force of the dog, nor the claws of the vulture; takes the water like an otter, and will continue under much longer; not able to ſupport the rigour of our winters; one come from the iſland of Ceylon climbed up the walls and the trees with very great eaſe; this animal one of thoſe formerly worſhipped by the Egyptians, ii. 240 to 242.

Ichneumon fly, its weapon of defence; flies of this tribe owe their birth to the deſtruction of ſome other inſect, within whoſe body they have been depoſited, and upon whoſe vitals they have preyed, till they came to maturity; of all others the moſt formidable to inſects of various kinds; it makes the body of the caterpillar the place for depoſiting its eggs; the tribe is not the caterpillar's offspring, as was ſuppoſed, but its murderers; deſcription; whence its name; fears not the waſp, and plunders its habitations; various appetites of the various kinds of this fly; the millions of inſects this fly kills in a ſummer inconceivable, iv. 282, to 284.

Ichneumon, a root the Indians believe an antidote for the bite of the aſp or the viper, ii. 241.

Idra, the deplorable infirmities of the workmen in the quickſilver mines near it, i. 51.

Jean-le-Blanc, a kind of eagle; its diſtinctive marks, iii. 87.

Jeniſca, in Tartary, a river, i. 124; receives above ſixty leſſer rivers, 128.

Jenkins, a peaſant, lived to a hundred and ſixty-five years, without much regularity, i. 340.

Jeſter, in England, as late as the times of King James I. the court was furniſhed with a jeſter, i. 366.

Jevraſka, name given to the marmout in Siberia, iv. 279.

Jewels. the richeſt jewels found in an Ethiop's ear, a proverb, i. 283.

Ignis fatuus, or wandering fire, i. 218.

Iguana, deſcription of this animal; its fleſh the greateſt delicacy of Africa, and America; its food; in what manner it is taken, iv. 112.

Jiboya, the great, of Java and Braſil, the dimenſions of this ſerpent, iv. 153.

Ilex, the berry-bearing ilex, iv. 299.

Imagination, by day as well as by night, always employed, i. 303; very remarkable inſtances of its power in women, 363.

Impaling, in ſome courts of the more barbarous princes of India, they employ the elephant to impale the criminals on its enormous tuſks, ii. 403.

Impregnation, the hare, though already impregnated, admits the male, and receives a ſecond impregnation, ii. 256; in what manner the ſea and garden-ſnails impregnate each other reſpectively, iv. 44, to 49; the bivalve ſhell-fiſh require no aſſiſtance from each other towards impregnation, 55; frogs impregnated without any apparent inſtrument of generation, an object of inquiry; continues in great obſcurity; experiments made to this purpoſe, 74.

Incas, Father Acoſta, and Garcilaſſo de la Vega have ſeen the bodies of ſeveral incas perfectly preſerved from corruption, i. 378.

India (Eaſt) in the warm countries of India, the women are marriageable at nine or ten, and the men at twelve or thirteen, i. 268; deſcription of the inhabitants of the iſlands that lie ſcattered in the Indian ocean; over all India, children arrive ſooner at maturity than in Europe; they often marry and conſummate, the huſband at ten years old, and the wife at eight, and frequently have children at that age; Indians have long been remarkable for cowardice and effeminacy; they may be conſidered as a feeble race of ſenſualiſts; their dreſs, 352, 353; the horſes of India are weak and waſhy, ii. 17; lions are found to diminiſh in their numbers in this country, 154; the Indians eagerly purſue the porcupine, in order to make embroidery of its quills, and to eat its fleſh, 314; they eat bats in the Eaſt Indies, 329. See *Elephant*, ii. 403.

India (Weſt) whence originally come the flat heads of the American Indians, i. 360.

Indus, river, its courſe, i. 124; its water and that of the Thames, the moſt light and wholſome in the world, 101; the tide at the mouth of this river the greateſt known, 150.

Infants, juſt born, may be ſaid to come from one element into another, and why; open their eyes the inſtant of their birth; more capable of ſuſtaining hunger; and more patient of cold than grown perſons, and why; infants have milk in their own breaſts; their life very precarious till the age of three or four; inſtances of it; the comparative progreſs of the underſtanding greater in infants, than in children of three or four years old, i. 259 to 263.

Inundations, generally greater towards the ſource of rivers, than farther down, and why, i. 122; ſome diſtribute health and plenty; others cauſe diſeaſes, famine, and death, 128; every inundation of the ſea attended with ſome correſpondent dereliction of another ſhore; one of the moſt conſiderable inundations in hiſtory, is that which happened in the reign of Henry the Firſt; an inundation in the territory of Dort, deſtroyed a hundred thouſand perſons; and yet a greater number round the Dullart; remarkable inundations in Friezland and Zealand, in which more than three hundred villages were overwhelmed; their remains continue viſible at the bottom of the water in a clear day; ſome in which the ſea has overflowed the country, and afterwards retired, 161, 162; inundation of the Thames at Dagenham in Eſſex, 165; inſtantly produced by land-ſpouts, 227.

Inſects, in the internal parts of South America and Africa, they grow to a prodigious ſize, and why; thoſe of the minute kind in the northern climates not half ſo large as in the temperate zone; the ocean has its inſects; their feet are placed upon their backs, and almoſt all without eyes, i. 233, 234; in ſome countries almoſt darken the air, and a candle cannot be lighted, without their inſtantly flying upon it, and putting out the flame, 237, and iv. 306; many may be multiplied by being cut in pieces, i. 242; many of the tribes brought forth from the egg, 245; have no eye-lids whatſoever, 276; the Indians are fearful of killing the meaneſt, 352; quickly brought to change, and adapt themſelves to the climate, 399; have their ſtomachs compoſed of muſcular fibres; of a ruminating kind, ii. 39, 40; afford ſo great a variety as to elude the ſearch of the moſt inquiſitive purſuer, iii. 36; thoſe with the greateſt number of legs move the ſloweſt, iv. 66; the general definition of inſects, 158; the different claſſes, 159; general characteriſtics of inſects without wings, 162; of thoſe that have wings, 197; ſome continue under the form of an aurelia not ten days; ſome twenty; ſome ſevera months, and even for a year, 238; general rule, that the female is larger than the male, 245; every inſect that lives a year after its full growth, is obliged to paſs four or five months without nouriſhment, and will ſeem to be dead all that time, 289; deſcription of that which forms and reſides in the gall-nut, 301.

Inſtinct of animals in chooſing the proper times of copulation, i. 413; the Guinea-pig has not that natural inſtinct ſo common to almoſt every other creature, ii. 284.

Inteſtines, in all animals the ſize of the inteſtines proportioned to the nature of the food, i. 403; inteſtines of ruminating animals enlarged by nature, to take in a greater ſupply; thoſe of the carnivorous kind are ſhort, ii. 37, 38; alſo thin and lean; but of the ruminating are ſtrong, fleſhy, and covered with fat, 39; of ſheep found to be above thirty times the length of the body; thoſe of the wild cat not above three times the length of its body, 151; this ſhortneſs ſtill unaccounted for, 152; of the rein-deer waſhed like our tripe, in high eſteem among the Laplanders, 127; of the bat, in ſome meaſure reſemble thoſe of man, 326; thoſe of the manati longer, in proportion, than thoſe of any other creature, the horſe excepted, 353; the tribe of woodpeckers want that inteſtine called the cæcum, iii. 163; the lamprey ſeems to have but one, 382; thoſe of the crab have many convolutions, iv. 12.

Johndore, Quin noted for a ſauce to this fiſh, iii. 335.

Joints, hair in its growth ſends forth branches at the joints, i. 277.

Jonſlin has obliged the curious with the firſt accurate deſcription of the form and nature of the ſable, ii. 239.

Ireland not infeſted with wolves, ii. 210; frogs deſignedly introduced into that kingdom ſome years before the Norway rat, 289; that rat put a ſtop to their increaſe, and the frog is once more almoſt extinct in that kingdom, 290; the mole utterly a ſtranger there, 303.

Iron extracted from all the ſubſtances upon earth, i. 49.

Iſatis, an animal very common in all northern countries bordering upon the icy ſea, and ſeldom found in warm climates; deſcription; burrows like the fox, and when with young, the female retires to her kennel, in the ſame manner as the fox; its kennel very narrow, and extremely deep, has many outlets; manner of coupling, time of geſtation, and number of young, all ſimilar to what is found in the fox; brings forth at the end of May, or the beginning of June; conſidered as between the dog and the fox; changes its colour, and is at one time brown, at another white; time in which it is called the *croſt fox*, ii. 221.

Iſinglaſs, ſerviceable in medicine, and many arts; manner of making it; principally furniſhed from Ruſſia, where great quantities are prepared ſurpriſingly cheap; Mr. Jackſon found out a method of making a glue that anſwered the purpoſes of iſinglaſs, iii. 387, 388.

Iſlands, new formed, in two ways; thirteen iſlands in the Mediterranean appearing at once emerging from the water; one new formed in the year 1720 near that of Tercera; formed at the mouths of many rivers, and how; a beautiful and large one formed at the mouth of the river Nanquin, in China, not leſs than ſixty miles long, and about twenty broad, i. 76 to 80; appear at firſt, infinitely greater than they naturally are; ſeem to travel to the ſhore, and repreſent a wood; the ſcene then ſhifted, repreſents curious figures, ſhips with ſails, ſtreamers, and flags; antique elevated caſtles, and at length vaniſh into nothing, 223.

Iſmael, (Sheque) in his time the Arabians firſt began the management of horſes, ii. 9.

Iſpahan, the prince's meſſengers go on foot thirty-ſix leagues in fourteen hours, i. 292, 293.

Italy, the horſes there have a particular aptitude to prance, ii. 14.

Jucatan, a peninſula in the Gulph of Mexico, formerly a part of the ſea, i. 161.

Juda-goat common in Guinea, Angola, and all along the coaſts of Africa, not much larger than a hare, ii. 69.

Jugular fiſh, name given to that fiſh which has the ventral fins placed more forward than the pectoral, iii. 398.

Julian's Bay, (St.) an American harbour, forty-nine degrees ſouth of the line; Ferdinand Magellan happened to winter in it, i. 371.

Juniper, its ſhade was fatal, if we credit the ancients, i. 188; the Laplanders drink water in which theſe berries have been infuſed, 348.

Ivory, the tuſks of the babyroueſſa are a very fine ivory, ſmoother and whiter than that of the elephant, but not ſo hard and ſerviceable, ii. 143; that of the morſe more eſteemed than that of the elephant, being whiter and harder, 351; almoſt all our ivory comes from Africa, where the greateſt part is found in the foreſts; the tuſks of the mammouth converted to the purpoſes of ivory, 405; teeth of the narwhale far ſurpaſs ivory in all its qualities, iii. 351.

Juſtinian, the emperor, till his time the ſea was open to all nations, i. 136.

Ivy-berries, ſhowers of them raiſed by tempeſts in one country, and falling in another, i. 224.

K.

Kabaſſou, or cataphractus, one of the largeſt kinds of the armadilla, ii. 325.

Kamtſchatka, deſcription of its natives, ii. 346.

Kanguroo, an animal firſt diſcovered and deſcribed by Mr. Banks, iii. 30.

Keratophites, among the coralline fungi, iv. 326.

Kermes, an inſect of great uſe in medicine and dying; its deſcription; the difference of the male from the female; the harveſt of the kermes greater or leſs in proportion to the ſeverity of the winter; women gather them before ſun-riſing, tearing them off with their nails, iv. 299.

Keſtril, a bird of the generous breed of hawks, iii. 99.

Kevel, name of a ſecond variety of gazelles, made by Mr. Buffon, ii. 76.

Kilda, (St.) a rocky iſland; its ſhores to the Weſt ſix hundred fathom perpendicular above the ſurface of the ſea, i. 158; the inhabitants conſume annually near twenty-three thouſand young gannets, and a great quantity of their eggs, iii. 278; its rocks more than three quarters of a mile high, 281.

Killer, a cetaceous animal of ſurpriſing ſtrength, which attacks the whale, iii. 346.

Kinds of animals not actually diſtinguiſhed by horns, colour, poſition of the ears, or fineneſs of hair, ii. 69; difficult to fix preciſe boundaries between the goat kind and the deer; the gazelles form a diſtinct kind, 75; all of the deer kind have no gall-bladder, 87.

Kine, in Iceland, are without horns, ii. 47.

King, a queſtion in ſchools, which man moſt happy, the beggar by night, and king by day; or the beggar by day and king by night, i. 305, 306.

King-fiſher, a remarkable bird; its deſcription; places it frequents, and how it takes its prey; the plumage a beautiful variety of brilliant colours; inſtances of credulity with reſpect to this bird; its neſt, or rather hole, very different from that deſcribed by the ancients; feeds upon fiſh in that hole; fœtid from the remains of fiſh; the king-fiſher is found with from five to nine eggs, which the female continues to hatch; though diſturbed and robbed ſhe returns, and lays again; Reaumur's account of this; ſeaſon for excluding the brood; the male, faithful beyond the turtle, brings the female large proviſions of fiſh, and keeps her plump and fat; he uſed to twitter before, now enters the neſt quietly and privately; the young hatched in twenty days; differ in their ſize and beauty, iii. 314 to 317.

King-fiſher, the *Halcyon*—Cicero has written a long poem in praiſe of this bird, of which but two lines remain; the emperor Gordian has alſo written a long poem on it, nothing of which is left; St. Ambroſe's credulity concerning this bird; fables the modern vulgar have of it; its fleſh unfit to be eaten, and its beautiful plumage preſerves its luſtre longer than any other, iii. 315 to 317.

Kircher, his calculations of the heights of the mountains are incredible, and why, i. 91; has ſet the voices of birds to muſic, iii. 111.

Kite, from the greateſt height darts down on its prey with unerring aim, iii. 40; one of the baſer race of hawks, 98; diſtinguiſhed by its forky tail, and ſlow floating motion; ſeems ever upon the wing, and to make no effort in flying; lives upon accidental carnage, every bird in the air being able to make its retreat from it; ſmall birds wounded, or ſtraying chickens it ſeizes with rapacity, 103; uſed for training falcons, and how lured with the great horned owl, when caught for that purpoſe, 112.

Kitten, of all young animals none more prettily playful, ii. 147.

Klein, his method of claſſing animals, i. 391.

Knobber, name of the ſtag the ſecond year, ii. 98.

Knot, ſmall bird of the crane kind, iii. 253; a bird of paſſages, 256.

Kob, the name of the ſixth variety of gazelles, by Mr. Buffon, ii. 77.

Koba, name of the fifth variety of gazelles, by Mr. Buffon, ii. 77.

Kraken, all that has been ſaid of this great fiſh ſeems fictitious, yet there is a poſſibility of its exiſtence, iii. 340.

Krantz's account of the origin and formation of the ice-mountains of Greenland, i. 143.

L.

Labrus, the wraſſe, deſcription of this fiſh, iii. 400.

Labyrinth of Candia, a ſubterranean wonder, ſuppoſed the work of art, i. 42.

Labyrinth, convolutions in the windpipe and lungs of ſome birds, iii. 42.

Lama, the camel of the new world; countries where found; their fleſh an excellent food; their hair, or rather wool, ſpun into beautiful clothing; carry their burdens over precipices and craggy rocks, where men can ſcarce accompany them; deſcription and age; manner of coupling; its food; exceeds the camel in temperance; requires little water, being ſupplied with quantities of ſaliva, the only offenſive weapon it has to teſtify its reſentment; the Indians ſay, where this ſaliva falls, it will, from its acrimonious nature, burn the ſkin, or cauſe dangerous eruptions; colour and wool; habits and marks of agility in the ſtate of nature; ſeems the largeſt of the camel kind in America; the natives hunt the wild lama for its fleece; a ſmaller weaker ſort of the camel kind, called alſo guanacoe and paco; the manufacture of ſtuffs, carpets, and quilts, made of the wool of the paco, form a conſiderable branch of commerce in South America, and might uſefully be extended to Europe, iii. 10 to 13.

Lambs, how to be produced all the year round, i. 414; the third an ewe brings forth, ſuppoſed the beſt, ii. 61.

Lamprey, a fiſh, every way reſembling the lamprey, was poſſeſſed of the numbing quality of the torpedo; people will not venture to touch thoſe of Ireland; a ſpecies very different from ours ſerved up as a delicacy among the modern Romans; doubtful whether it be the murena of the ancients, which our lamprey is not; ours differently eſtimated according to the ſeaſon; thoſe of the river Severn the moſt delicate of all fiſh; deſcription of the fiſh's extraordinary power of adhering to ſtones; inſtance of it; Muralto giving the anatomy of this fiſh, makes no mention of the lungs, for which it has abſolute neceſſity to breathe in the air; its time of leaving the ſea annually, in order to ſpawn, is the beginning of ſpring; after a few months it returns to the ſea; peculiar preparation for ſpawning; the young from eggs; the female remains at the place where produced; has her family playing about her, and conducts them in triumph to the ocean; its food; ſome continue in freſh water till they die; a ſingle brood the extent of the female's fertility, two years being the limits of her exiſtence; beſt ſeaſon for them in the months of March, April, and May; are uſually taken in nets with ſalmon, ſometimes in baſkets at the bottom of the river; old cuſtom for the city of Glouceſter annually to preſent the king with a lamprey pie; a ſenator of Rome uſed to throw into the ponds ſuch of his ſlaves as diſpleaſed him, to feed the lampreys, iii. 380 to 383.

Lands, new, produced from the ſea, and in what manner, i. 161.

Lanner, bird of the generous breed of hawks, now little known in Europe, iii. 99.

Lapland, its diviſion, ii. 120; mountains there preferred to the woods; the country abounds more than others with marſhy bottoms and weedy lakes; gnats and gad-flies formidable there, 121; the manner of travelling in it; Laplanders caſtrate the rein-deer with their teeth, 124, 125; the wolf never attacks a rein-deer that is haltered, and why, 211; the iſatis found in this country, 221; in the foreſts, ſquirrels obſerved to change their habitation; they remove in numbers from one country to another, 271.

Laplanders, one of the firſt diſtinct races of men round the polar regions; deſcription of their perſons and manners; have in every family a drum for conſulting the devil; Guſtavus Adolphus attempted in vain to form a regiment of Laplanders; uſe ſkates to run and ſlide, and how; are all hunters; offer their wives and daughters to ſtrangers, i. 346 to 348; wants ſupplied, and riches derived from the rein-deer, ii. 118; manner of life, 120; boil milk with wood-ſorrel, and keep it in caſks under-ground to be eaten in winter, 127; when the lemings draw up to fight, they form ominous prognoſtics from their arrangement, 301; happy when an army of lemings comes down among them; they then feaſt upon their fleſh, which cats and dogs deteſt, 302.

Lapwing, a ſmall bird of the crane kind, iii. 253; its arts to lead off men and dogs from their neſts; their ſeaſons of courtſhip, 258.

Lark, bird of the ſparrow kind, iii. 196; the ſky, the wood, or the tit lark diſtinguiſhable from other little birds by length of heel, and loud ſong; neſt, number of eggs, and habits, 207; thoſe that remain with us the year throughout are birds of paſſage in Sweden, 198, 199

Lark, (Sea) a ſmall bird of the crane kind, iii. 253; breeds in this country, 256.

Lava, matter diſcharged by the eruptions of volcanos, i. 64.

Laughter, in what manner produced, i. 280.

Launce, deſcription of this fiſh, iii. 402.

Lauricocha, a lake wherein the river Amazons has its ſource, i. 126.

Lawrence, (St.) a river; its riſe and ſource, i. 127; receives about forty rivers, 128; its cataract, 131.

Laws, one in the Orkney iſlands, entitling any perſon that kills an eagle to a hen from every houſe in the pariſh where killed, iii. 84.

Layer, the impreſſion on the place where the ſtag has lain, ii. 98.

Layers of the earth regularly diſpoſed, but not of the ſame kind in every place; enumeration of earth in a well dug at Amſterdam, and of another dug at Marly; a layer, as far as it extends, always maintains the ſame thickneſs; proceeding to conſiderable depths, every layer is thicker; are ſometimes very extenſive, and often found to ſpread over a ſpace of ſome leagues in circumference, i. 39, 40; remarkable layers of earth round the city of Modena, 164.

Lead mine, one in Flintſhire, ii. 405.

Leather called ſhammoy, made of the ſkin of that animal, and alſo from thoſe of the tame goat, the ſheep, and the deer, ii. 74.

Leather-harneſs devoured by the jackal, ii. 219.

Leaves, two of a fig-tree, by experiment, imbibed from the earth two ounces of water in five hours and a half, i. 115.

Leech, different kinds; its deſcription; takes a large quantity of food; has no anus or paſſage to eject it from the body when digeſted; in what it differs from the reſt of the reptile tribe; the leech uſed in medicine; a girl of nine years old killed by leeches; beſt way of applying leeches, iv. 193 to 196.

Legs, a man without them performed aſtoniſhing feats of dexterity, ii. 388.

Leming, a bold animal of the rat kind, native of Scandinavia; often pours down in myriads from the northern mountains, and, like peſtilence, deſtroys all the productions of the earth; Laplanders believe they drop from the clouds; their deſcription; they move, in a ſquare, forward by night, and lying ſtill by day; whither their motions are turned nothing can ſtop them; a fire, a deep well, a torrent does not turn them out of their direction; they never retreat; interrupted by a boat acroſs a river, they go over it; ſtopped by a ſtack of hay or corn, they gnaw their way through; and obſtructed by a houſe they cannot get through, continue before it till they die; eat nothing prepared for human ſubſiſtence; never enter a houſe to deſtroy proviſions; paſſing through a meadow, deſtroy it in a ſhort time, and leave it with the appearance of being burnt up and ſtrewed over with aſhes; a man imprudently attacking one of them, the animal furiouſly flies at him, barking ſomething like a puppy, faſtens, and does not eaſily quit its hold; their leader forced out of the line after a long defence, and ſeparated from the reſt, ſets up a plaintive cry, not of anger, and hangs itſelf on the fork of a tree; they deſtroy and devour each other; after incredible devaſtations, they ſeparate into armies, oppoſed with deadly hatred, and move along the coaſts of the larger lakes and rivers; the Laplanders form prognoſtics from the manner of their arrangement; what prognoſtics; the diviſions; continue their engagements and animoſity until one party be overcome, then they diſappear; and it is ſuppoſed, that having nothing to ſubſiſt on, they devour each other; their carcaſes ſometimes infect the air for miles round, and produce malignant diſorders; they ſeem alſo to infect the plants, the cattle often dying in the places where they paſſed; the male larger, and more beautifully ſpotted than the female; are extremely prolific; breeding does not hinder their march, ſome carrying one young in their mouth and another on their back; are greatly preyed upon by the ermin, and even by the rein-deer; dogs and cats deteſt their fleſh, but the Laplanders eſteem it good eating, and devour it greedily, ii. 299 to 302.

Leo, the emperor, granted the nations in poſſeſſion of the ſhore the ſole right of fiſhing before their reſpective territories, i. 136.

Leopard, the American is neither ſo fierce nor ſo valiant as that of Africa and Aſia, i. 411; leopard will not fly at the approach of the lion, ii. 160; the large, and the leopard or panther of Senegal; differences between theſe animals, 174.

Lepadogaſter, deſcription of this fiſh, iii. 402.

Leproſy, in what manner the Indians endeavour to prevent the Arabian leproſy, or the elephantiaſis, a diſeaſe to which man and the elephant are equally ſubject, ii. 396.

Lerot, the middle dormouſe, according to Mr. Buffon, ii. 295.

Leymmer, a dog of the generous kind, ii. 192.

Libelia, the dragon fly; general characteriſtics; eggs; food of the young; how they prepare to change from the reptile to the flying ſtate; deſcription; the ſtrongeſt and moſt courageous of all winged inſects; the buſineſs of impregnation how performed, iv. 198 to 201.

Liboya, the greateſt of the ſerpent kind, iv. 125.

Licehen rangiferinus, the food of the rein-deer, a moſs in Lapland of two kinds, the white in the fields, and the black on the trees, ii. 120, 123.

Lidme, name of the eleventh variety of gazelles, by Mr. Buffon, ii. 79.

Life, formerly ſuppoſed producible only by oviparous and viviparous generation, but later diſcoveries induce many to doubt whether animal life may not be produced merely from putrefaction, i. 242; the beginning of our lives, as well as the end, is marked with anguiſh, 256; that of infants very precarious till the age of three or four; inſtances of it, 262; the duration of life in general nearly the ſame in moſt countries, 340, 341; the moſt uſeleſs and contemptible of all others the moſt difficult to deſtroy, iv. 314.

Light, the hand expoſed to broad day-light ſome time, then immediately ſnatched into a dark room, will ſtill be luminous, and remain ſo for ſome time, and why; dangerous to the ſight to look ſteadily upon bright and luminous objects, and why; ſuch perſons as read or write for any continuance ſhould chooſe a moderate light, i. 317

Light ſent fourth by the glow-worm, how produced hitherto inexplicable, iv. 297; ſent forth by the ſtar-fiſh reſembles that of phoſphorus, 314.

Lightening, is an electrical flaſh produced by the oppoſition of two clouds, i. 215; of the torrid zone not ſo fatal or ſo dangerous as with us, otherwiſe, thoſe regions would be uninhabitable, 218; flaſhing without noiſe illuminates the ſky all round in the torrid zone, 217.

Lights, northern lights illuminate half the hemiſphere, i. 217.

Limbs, of the inhabitants near the poles are ſometimes frozen and drop off; ſome animals live without, and often are ſeen to reproduce them, iv. 312.

Lime, manner of making it in Perſia, i. 55.

Line, upon the approach of winter months under the line, the whole horizon ſeems wrapt in a muddy cloud, i. 217; in America, all that part of the continent which lies under the line is cool and pleaſant, 357; in general, as we approach the line, we find the inhabitants of each country grow browner, until the colour deepens into perfect blackneſs, 358.

Linnæus, the celebrated naturaliſt, ſuppoſes man a native of the tropical climates, and only a ſojourner more to the north; argument to prove the contrary, i. 361; his method of claſſing animals, 392; makes the female of the bat, *a primas*, to rank in the ſame order with man, ii. 328.

Linnet, a bird of the ſparrow kind, iii. 197; taught to whiſtle a long and regular tune, 213.

Lion, to compare the ſtrength of the lion with that of man, it ſhould be conſidered that the claws of this animal give a falſe idea of its power, aſcribing to its force what is the effect of its arms, i. 291; does not willingly attack the horſe, and only when compelled by the keeneſt hunger; combats between a lion and a horſe in Italy; the lion ſtunned and left ſprawling, the horſe eſcapes, but the lion ſucceeding, ſticks to its prey, and tears the horſe to pieces inſtantly; leaps twenty feet at a ſpring, 403 to 405; produced under the burning ſun of Africa, is the moſt terrible and undaunted creature; he degenerates when removed from the torrid zone, ii. 153; deſcription of this noble animal; a ſingle lion of the deſert often attacks an entire caravan; he crouches on his belly, and continues ſo with patient expectation, until his prey comes within a proper diſtance; the female has no mane; his roaring is ſo loud, that when heard in the night, and re-echoed by the mountains, it reſembles diſtant thunder, 155 to 159; in countries tolerably inhabited, the lion is cowardly, and often ſcared by the cries of women and children, 147; attends to the call of the jackal, 220.

Lions, thoſe of mount Atlas have not the ſtrength or ferocity of thoſe of Biledulgerid or Zaara; ſpecies of this animal diminiſhing daily; Mr. Shaw obſerves, the Romans carried fifty times as many lions from Lybia in one year, for their amphitheatres, as are in the whole country at this time; the ſame remark made with regard to Turkey, Perſia, and the Indies, where lions diminiſh in their number daily; thoſe inhabiting the peopled countries of Morocco, or India, ſcared away with a ſhout; the keepers play with him, plague, and chaſtiſe him without a cauſe, he bears it with compoſure, but his anger once excited, the conſequences are terrible; an inſtance from Labat; numberleſs accounts aſſure his anger noble, his courage magnanimous, and his natural ferocity ſeldom exerted againſt his benefactors; he has ſpared the lives of thoſe thrown to be devoured by him, afforded them part of his ſubſiſtence, and ſometimes abſtains from food himſelf to ſupport them; neceſſity alone makes him cruel; the manner of hunting them by Hottentots and others; reported that he ſuſtains hunger a long time, but thirſt he cannot ſupport; ſome believe him in a continual fever; he drinks as often as he finds water, and laps it; he requires about fifteen pounds of raw fleſh in a day; he rather hunts for a freſh ſpoil, than return to that he had before; his breath is offenſive, and his urine inſupportable; horſes for hunting them of that ſort called charoſſi, all others fly at the ſight of him, ii. 154 to 160; the lion prefers the fleſh of camels to other food; is alſo fond of that of young elephants; when old, finding men and quadrupeds together, he attacks the latter, and never meddles with men, unleſs provoked; manner of copulation; time of geſtation, number brought forth, and time taken to come to perfection, all known; a lion in the Tower of London above ſeventy years; the lioneſs fearing her retreat diſcovered, hides her tracks by running back, or bruſhing them out with her tail; becomes terrible with young ones to provide for; lions, incited by deſire, fight bloody battles, till one becomes victorious over the reſt; the ſize of the lion between three and four feet; the female, in all dimenſions, about one third leſs; there are properly no lions in America, the *puma* has received the name of the *American lion*, but, when compared, is a very contemptible animal, 161 to 163.

Lion cat, or *Angora-cat*, a beautiful animal, a native of Syria or Perſia, ii. 152.

Lion, (Sea) deſcribed in Anſon's voyages, regarded as the largeſt of the ſeal family, ii. 350.

Lipidopus, the garter-fiſh, its deſcription, iii. 403.

Lips, thoſe of the hare and of the ſquirrel continually move, whether ſleeping or waking, ii. 255.

Litters, in all animals, intermediate litters moſt fruitful; firſt and laſt generally produce feweſt and weakeſt of the kind, i. 413.

Littorales, Latin name for thoſe ſhells that are caſt upon ſhore, iv. 40.

Liver of a ſhark affords three or four quarts of oil, iii. 369.

Lizards, along the coaſts of Guinea their fleſh eſteemed a delicacy, ii. 198; differ from every other claſs of animals, and from each other, iv. 92, to 95; whence the greateſt diſtinction; general characteriſtics; the water-kind changes its ſkin every fourth or fifth day; ſprinkled with ſalt, the whole body emits a viſcous liquor, and the lizard dies in three minutes, in great agonies; whole of the kind ſuſtain the want of food in a ſurpriſing manner, 110.

Lizard (Chalcidian) of Aldrovandus deſcribed, iv. 116.

Lizard (flying) of Java, account of it by Gentil, iv. 116.

Loach, a deſcription of this fiſh, iii. 404.

Lobſter, a ruminating fiſh, ii. 39; very voracious, though without warmth in its body, or red blood in its veins; whatever it ſeizes upon and has life periſhes, however well defended; they devour each other, and, in ſome meaſure, eat themſelves, changing their ſhell and ſtomach every year, the old ſtomach is the firſt morſel to glut the new; at firſt ſight, the head may be miſtaken for the tail; its deſcription; the food of the young; the molting ſeaſon; how they change their ſhells; many die under this operation; ſpeedy growth of the new ſhell; and of itſelf after the change; the claws of unequal magnitude, and why; at certain ſeaſons they never meet without an engagement; wonders this extraordinary creature offers to imagination; are endowed with a vital principle that furniſhes out ſuch limbs as have been cut away; varieties of this animal with differences in the claws, little in the habits or conformation; the ſhell black when taken, but turns red by boiling; common way of taking the lobſter, iv. 7 to 12.

Locuſt, the great brown locuſt ſeen in ſeveral parts of England in 1748; in ſome ſouthern kingdoms they are ſtill formidable; deſcription of this inſect; in what manner they take the field; their devaſtations; are ſtill more noxious when dead; inſtance of it; account of their devaſtations in Ruſſia, Poland, Lithuania, and Barbary; transformations; eaten by the natives in many kingdoms of the Eaſt, and caught in ſmall nets for that purpoſe; their taſte; are conſidered as a great delicacy in Tonquin, by the rich and the poor; muſt have been a common food with the Jews; deſcription of the great Weſt Indian Locuſt, the moſt formidable, iv. 211 to 215.

Loir, the greater dormouſe, ſo called by Mr. Buffon, ii. 295.

Longevity, perſons remarkable for it, i. 339.

Lorenzini, his experiments upon the torpedo, iii. 379.

Lori, the longeſt of all animals, in proportion to its ſize; deſcription; a native of the iſland of Ceylon, ii. 383.

Loricaria, deſcription of this fiſh, iii. 403.

Lories, a kind of parrot, iii. 175.

Louſe, its deſcription; whether diſtinguiſhed by the parts of generation into males and females, not yet diſcovered; the louſy diſeaſe frequent among the ancients, iv. 175, to 177.

Louſe (wood) the deſcription; of great uſe in medicine, iv. 183.

Lewenhoeck, his opinion about the rudiments of animals, i. 240.

Luminous appearance of the waves in the night, the cauſe, i. 144.

Lump-fiſh, its deſcription; flung into a pail of water, will ſtick ſo cloſe to the bottom, that on taking the fiſh by the tail, the pail and ſeveral gallons of water may be lifted; their fleſh, iii. 390.

Lungs, animals before birth make no uſe of their lungs, ii. 345; no anatomiſt has deſcribed the lungs of the lamprey, iii. 381; caterpillars have eighteen lungs, and live ſeveral days in the exhauſted receiver of the air-pump, iv. 232.

Lybia, its inhabitants uſe oſtriches as horſes; alſo at Joar; inſtance of it at the factory of Podore, iii. 68.

Lyboija of Surinam, a kind of ſerpent, thirty-ſix feet long, iv. 124.

Lynx, diſtinguiſhed from the ounce, and deſcribed; firſt ſtriking diſtinction between it and thoſe of the panther kind is the tail; each hair of this animal is of three different colours; it is not above the ſize of the ounce; chiefly met with in the cold countries bordering on the pole, in the north of Germany, Lithuania, Muſcovy, Siberia, and North America; thoſe of the New Continent are ſmaller than in Europe; this animal has been called the *lupus cervarius*, but for what reaſon hard to gueſs; in its nature it exactly reſembles the cat, is bigger, and near two feet long, is alſo bolder and fiercer; more delicate than the cat; reſembles the wolf in nothing except its cry; ſeveral reports of the lynx, propagated by ignorance or impoſture, ii. 176 to 181.

Lyſter, ſtrangeneſs of his theory to explain the invariable motion of winds, i. 197.

Lythophytes and coralline ſubſtances, iv. 323.

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Macaguo, a kind of monkey deſcribed by Mr. Buffon, ii. 379.

Maccaw, the large kind of parrot, the ſize of a raven, iii. 175.

Machinel-tree, in America, its ſhade fatal, i. 188; no plant will grow under it, i. 233.

Machines, the invention of many has rendered human ſtrength leſs valuable, i 295.

Mackarel, produces five hundred thouſand eggs in one ſeaſon, iii. 333; deſcribed, 400; its growth, 417.

Madagaſcar, its natives deſire nothing ſo ardently as to proſtitute their wives or daughters to ſtrangers, and for the moſt trifling advantages, i. 270; the great bat of that iſland deſcribed, ii. 330.

Madder. See *Blood*, i. 336.

Madneſs, produced by want of ſleep, i. 303; cured by muſic, and alſo cauſed by it. See *Henry IV.* i. 323.

Maelſtroom, Dutch name for a whirlpool, one upon the coaſt of Norway, conſidered as moſt dreadful and deſtructive; the body of water forming this whirlpool, extended in a circle of above thirteen miles, i. 155, 156.

Magellan (Ferdinand), a Portugueſe of noble extraction, firſt diſcovered the gigantic race of mankind, towards the extremity of South America; account of this diſcovery; he was ſlain upon one of the Molucca iſlands, i. 371.

Magni, an Italian traveller, diſcovered the remarkable grotto of Antiparos, in the Archipelago, i. 45.

Magot of Buffon, the cynocephalus, the laſt of the ape kind; its deſcription, ii. 365.

Magpie, thieviſh; rings found in the neſt of a tame magpie, iii. 149; habits and food; when ſatisfied for the preſent it lays up the remainder for another time; places where it builds, and neſts deſcribed; number of eggs; in its domeſtic ſtate, preſerves its natural character ſtrictly; fooliſh cuſtom of cutting its tongue to teach it to ſpeak; puts the animal to pain, and baulks the intention, 157, to 159.

Mahometans, conſidering the hare as an unclean animal, religiouſly abſtain from its fleſh, ii. 261.

Maimon, the laſt of the baboons, Edwards calls it the *pigtail*; its deſcription; native of Sumatra, does not well endure the rigours of our climate, ii. 369.

Maire (James Le), a traveller who confirms the exiſtence of giants in America, i. 372.

Maki; the laſt of the monkey kind, ii. 355; their deſcription; many different kinds of theſe animals, 382, 383.

Malabar, land and ſea-breezes upon thoſe coaſts, i. 202.

Malacopterigii, the barbarous Greek name given to the ſoft-finned fiſh; the prickly-finned ſort termed *Acanthopterigii*, iii. 397.

Malaballo, a very conſiderable volcano in South America, i. 62.

Malebranche, grounds his beautiful theory of monſtrous productions upon a famous inſtance related by him, and ſome theory from which he deduces the effects of imagination upon the fœtus, i. 363.

Malbrouk, a monkey of the ancient continent; its deſcription; the Bramins have hoſpitals for ſuch as are ſick or diſabled, ii. 379.

Maldivia Iſlands, have lands in them at one time covered with water, and at another free, i. 162.

Mallard, a kind of duck, iii. 308; with very particular faculties for calling, 310.

Malpighi, his famous experiment upon the ſtigmata of caterpillars, iv. 232.

Mammouth, its tuſks, which are uſed as ivory, and ſuppoſed to belong to the elephant, often weigh four hundred pounds, ii. 405.

Man, endures a greater variety of climates than the lower orders are able to do, and why, i. 185; differences in his ſpecies leſs than in animals, and rather taken from the tincture of the ſkin than variety of figure; there are not in the world above ſix diſtinct varieties in the race of men; firſt race in the polar regions, deep brown, ſhort, oddly ſhaped, ſavage; ſecond, the Tartar race, olive-coloured, middle ſized, ugly, robuſt; third, the ſouthern Aſiatics, dark olive, ſlender ſhaped, ſtraight black hair, feeble; fourth, the Negroes of Africa, black, ſmooth ſkin, woolly hair, well ſhaped; fifth, the Americans, copper colour, ſtraight black hair, ſmall eyes, ſlight limbed, not ſtrong; ſixth, the Europeans and bordering nations, white, and of different tints, fine hair, large limbed, vigorous, 345 to 356; may be called the animal of every climate, 235; intended naturally to be white, 357; white men reſemble our common parent more than the reſt of his children; a native of the tropical climates, and only a ſojourner more to the north, according to Linnæus; argument ſufficient to prove the contrary, 360, 361; marriageable in the warm countries of India at twelve and thirteen years of age, 268; juſt come into the world gives a picture of complete imbecility, 258; vain man ventures to excite an auditor's attention, at the riſk of incurring his diſlike, 284; as man has a ſuperiority of powers over other animals, ſo is he proportionably inferior to them in his neceſſities; nature has made him ſubject to more wants and infirmities than other creatures, but all theſe wants ſeem given to multiply the number of his enjoyments; and in what manner, 297; firſt ſenſations of a man newly brought into exiſtence, and the ſteps by which he arrives at reality pointed out by Mr. Buffon, 332; the only animal that ſupports himſelf perfectly erect; the buttock, in man, different from that of all other animals; man's feet alſo different from thoſe of other animals, the ape's not excepted; the nails leſs in man than in any animal, 287, 288; ſaid to be tall when from five feet eight inches to ſix feet high, 289; probability that men have been, in all ages, much of the ſame ſize they are at preſent, 374; proportionably ſtronger for his ſize than any other animal; to compare the ſtrength of the lion with that of man, it muſt be conſidered the claws of the animal give a falſe idea of its power, and aſcribe to its force the effects of his arms; another manner of comparing the ſtrength of man with that of animals, is by the weights which either can carry; Dr. Deſaguliers ſpeaks of a man able to raiſe two thouſand pounds, by diſtributing the weights in ſuch manner that every part of his body bore its ſhare, 291; exerciſed in running, outſtrips horſes; a ſtout walker, in a journey, walks down a horſe; thoſe employed as meſſengers at Iſpahan in Perſia, runners by profeſſion, go thirty-ſix leagues in fourteen hours, 292; every animal endures the wants of ſleep and hunger with leſs injury to health than man, 297; he cannot, uninjured, live four days without eating, drinking, and ſleeping, 298; one ſaid to live without food for ſeven days, 302; requires ſleep for double motives, the refreſhment of the mental as well as the bodily frame, 303; more difficult for man than any other animal to procure ſleep, 304; has a lump upon the windpipe not to be ſeen in woman, 285; a young man deaf and dumb from his birth, knew nothing of death, and never thought of it till the age of twenty-four, when he began to ſpeak all of a ſudden, 326; account of a man ruminating, ii. 40; in thoſe countries where men are moſt barbarous and ſtupid, there brutes are moſt active and ſagacious, 378; one, without hands or legs, by practice uſed his ſtumps for the moſt convenient purpoſes, and performed aſtoniſhing feats of dexterity, 388; man dies under wounds which a quadruped or a bird could eaſily ſurvive, iv. 312.

Manufactures, the woollen manufacture not carried on here till ſeveral ages after ſheep were propagated in England; unavailing efforts of our kings to introduce and preſerve it; the Flemings poſſeſſed the art in a ſuperior degree; the inhabitants of the Netherlands improved us in this art, and when; the woollen manufacture ſuppoſed for ſome time decaying among us, ii. 60; of ſtuffs of the wool of the pacos, a conſiderable branch of commerce in South America, iii. 13.

Manati, may indiſcriminately be the laſt of beaſts, or the firſt of fiſhes; its deſcription; the female has breaſts placed forward, like thoſe of women; the tongue ſo ſhort, ſome have pretended it has none; never entirely leaves the water, only advances the head out of the ſtream, to reach the graſs on the river ſides; it feeds entirely on vegetables; places where found; graze among turtles and other cruſtaceous fiſhes, giving or fearing no diſturbance; unmoleſted they keep together in large companies, and ſurround their young; bring forth in autumn; and ſuppoſed to go with young eighteen months; the manati has no voice nor cry; its inteſtines are longer in proportion than thoſe of any other creature, the horſe excepted; the fat which lies under the ſkin, expoſed to the ſun, has a fine ſmell and taſte, and exceeds the fat of any ſea animal; the heat of the ſun does not make it rancid; it taſtes like the oil of ſweet almonds, and ſerves every way inſtead of butter; any quantity may be taken inwardly, having no other effect than to keep the body open; the fat of the tail, boiled, more delicate than the former; the lean takes a long time in boiling, and eats like beef; the fat of the young like pork, and the lean like veal, ii. 352, 353.

Mandril, the largeſt of the baboon kind; its deſcription; when diſpleaſed, weeps like a child; is a native of the Gold Coaſt, ii. 369.

Mangabey, a monkey of the ancient continent; its deſcription, ii. 379.

Mangrove-tree, that grows down in the water of the Senegal river, i. 129.

Manks-puffin, or *coulterneb*, a ſmall water-fowl, deſcribed, iii. 292, 295.

Marcaſites, their compoſition; experiment by way of proof, 150.

Mares, their exportation prohibited by law in Arabia; ii. 12; ſtuds in Perſia of ten thouſand white mares, with hoofs ſo hard, that ſhoeing is unneceſſary, 13; a law in England, prohibiting the the exportation of mares and ſtallions; and one ſimilar to this obtained ſo early as the time of Athelſtan, 20.

Marikina, a monkey of rhe ſagoin kind, with a mane round the neck, and a bunch of hair at the end of the tail, like a lion, ii. 381.

Marmoſe, only differs in ſize from the oppoſſum, being leſs; inſtead of the bag to receive the young, has only two longitudinal folds, within which the premature young continue to ſuck; when firſt produced not above the ſize of a bean; but ſtick to the teat until they arrive at maturity, ii. 386, 387.

Marmout, or *marmotte*, a ruminating animal; ii. 39; a native of the Alps; its deſcription; is eaſily tamed, readily taught to dance, wield a ſtick, and obey the voice of its maſter; it has an antipathy to the dog; ſtrength and agility; ludicrous ſaying that the Savoyards, the only chimney-ſweepers of

Paris, have learned their art from the marmotte they carry about for ſhew; is apt to gnaw the furniture; other affections of this animal; its food; is cleanly, but has a diſagreeable ſcent; ſleeps during winter; form of its hole reſembles the letter Y; manner of making it; they live together, and work in common to make their habitations ſnug and convenient; when they venture abroad, one is placed as centinel upon a lofty rock; Mr. Buffon ſays is does not ſleep during winter, is rather in a torpor, a ſtagnation of all faculties; its heat not more than ten degrees above congelation; the fleſh ſaid to have a wild taſte, and to cauſe vomiting; countries where it is found; inhabitants of the Alps do not till winter open its hole; produces but once a year, and brings forth three or four at a time; they grow faſt, and their lives not above nine or ten years, ii. 274 to 279.

Marriage and conſummation of the Indians, the huſband at ten years old, and the wife at eight; frequently have children at that age, i. 352.

Marriotte, his experiment proves that water acts as a menſtruum upon air, i. 212.

Marrow, ſpinal, and the brain, the firſt ſeen as begun in the embryo, i. 309.

Marſigli, *(Count)* his opinion upon corals and ſpunges, iv. 324.

Martin, its deſcription; the moſt beautiful of all Britiſh beaſts of prey; its ſcent a pleaſing perfume; the yellow-breaſted martin; its fur more valuable than the white-breaſted ſort; Mr. Buffon ſuppoſes them a diſtinct ſpecies, that diſtinction unneceſſary; of all the weaſel-kind the moſt pleaſing, ii. 235, 236; feeds as they do, and it fond of honey, 231; ſeldom meets the wild cat without a combat; the wild cat not a match for the martin; kept tame by Geſner and Mr. Buffon; often ſlept for two days, and then was two or three days without ſleeping; the yellow-breaſted more common in France than England; in that retreat the female brings forth her young, three or four at a time; and they come with the eyes cloſed; how ſhe compenſates for her deficiency of milk; this animal more common in North America than in Europe; found in all northern parts of the world, from Siberia to China, and Canada; ſmall birds alarm the ſpot where the dam keeps her young, and direct the hunter in his purſuit; the white-breaſted keeps near houſes and villages; the yellow in woods, leads a ſavage life, 236 to 238; its neſt generally the tenement of the ſquirrel, taking poſſeſſion and killing the owner, 270; ſeizes alſo the flying ſquirrel, 273.

Martin, a bird of the ſwallow-tribe, iii. 213.

Maſtiff, one of the three deſcendants of the ſhepherd's dog, ii. 190; chiefly a native of England; when tranſported into Denmark, becomes the little Daniſh dog, 191; the Dutch maſtiff, 192.

Maſtiff-fox, ſecond variety of foxes, leſs than the grey-hound fox, ii. 217.

Maturity, attained too by ſlow ſteps, announces a ſlow march to old age; as true to other animals as to man and vegetables, i. 339; ſooner arrived at in India than in Europe, 352.

Maw, in fiſhes, poſſeſſes the power of digeſting, iii. 326.

Maximin, *(the Emperor)* a prodigy of ſtrength; ſeveral inſtances of it; by birth a Thracian; from being a ſimple herdſman he roſe by the gradations of office, until he came to be Emperor of Rome, was above nine feet in height, and the beſt proportioned man in the Empire; was killed by his own ſoldiers, while ſleeping, i. 294, 295.

May-bug, or dor-beetle, deſcribed, iv. 292. See *Beetle*.

Meaſled hares, diſtinguiſhed from mountain hares, ii. 260.

Mechaniſm, which regulates the number of our years, admits no change in its laws, and can be affected only by long faſting, or great exceſs, i. 340.

Medauro, the braſs helmet dug up there fits a common man, yet is allowed to have been left there at the overthrow of Aſdrubal, i. 374.

Media, has paſtures in its plains, excellent for rearing horſes, ii. 16.

Mediterranean ſea, always receiving, and never diſcharging water, is no way fuller than before; in what manner ſome account for this, i. 153; water ſpouts ſeen in it; deſcription of them by Tournefort; ſolutions offered for this phenomenon by Mr. Buffon and Dr. Stuart, 224 to 226; this ſea one of the ſmootheſt and moſt gentle in the world, 155.

Meduſa, name given by Linnæus to a ſmall inſect, thought the ſimple food of the great Greenland whale, iii. 345.

Meibomius, has collected ſome few remains of ancient muſic, which do not leave room to regret what is loſt, i. 322.

Membrane, the nictitating membrane in birds; veils the eye at pleaſure, iii. 40.

Mendip mines, in Somerſetſhire, account of them by Mr. Locke, i. 50.

Menſtruum, that body which is moſt fluid and penetrating, is likely to be the menſtruum of one leſs ſo; Mariotte's experiment ſhews that water will act as a menſtruum upon air, cold diminiſhes the force of menſtruums, and often promotes evaporation, i. 212, 213.

Merlin, the ſmalleſt of the hawk or falcon-kind; ſcarce larger than a thruſh; diſplays a degree of courage rendering him formidable to birds far above his ſize; kills a partridge or a quail at a ſingle pounce from above, iii. 99.

Metals, the richeſt, in their native ſtate, much leſs glittering and ſplendid than uſeleſs marcaſites, i. 49; thoſe trades that deal in their preparations, always unwholeſome, 188; all pieces ſwallowed by animals loſe part of their weight, and often the extremities of their figure, iii. 64.

Meteors, between the tropics, and near the poles, aſſume dreadful and various appearances, i. 216; in thoſe countries where the ſun exerts the greateſt force in raiſing vapours, there are the greateſt quantity of meteors, 217; one of a very uncommon kind, ſeen by Ulloa, at Quito, 220.

Method, the principal help in natural hiſtory; without it little progreſs made in this ſcience; the moſt applauded of claſſing animals; the author's method of claſſing them; that of deſcribing all things by words alone, a fault that has infected moſt of our dictionaries, and bodies of arts and ſciences; Mr. Locke has obſerved, that a drawing of an animal, taken from life, is the beſt method of advancing natural hiſtory, i. 387 to 397.

Mew, ſaid of ſtags when they caſt their heads, ii. 98.

Mice, have burrowed in the back of hogs, while fattening in the ſty, without being felt, ii. 134; in 1580, at Hallontide, an army of mice over-run the marſhes near Southminſter, and eat up the graſs to the roots; but ſoon after they were all devoured by a number of ſtrange painted owls, iii. 113.

Mico, the leaſt and moſt beautiful monkey of the ſagoin kind, ii. 381.

Microſcope, increaſes the magnitude of an object, and that of its motion alſo, i. 241; the pupil and humours of the eye of the mole diſcovered by it, ii. 303

Migrating fiſhes, iii. 409. See *Fiſhes*.

Migration, cauſes of migration of birds; in what manner they perform them; at what times; rather follow weather than country, and go on as they perceive the atmoſphere more ſuitable to their wants and diſpoſitions; migration of ſome ſwallows, and retreat of others into old walls, to avoid the rigour of winter, wrap this ſubject in great obſcurity, iii. 51 to 54; of bees, ſeveral ſigns previous to it, iv. 267.

Milk, infants have it in their own breaſts, i. 262; ſometimes found in the breaſts of men, as well as in thoſe of women, 286; in carnivorous animals more ſparing than in others, 413; of goats medicinal, and not apt to curdle upon the ſtomach as that of the cow, ii. 66; of the rein-deer thinner than that of the cow, but ſweeter and more nouriſhing, 122; boiled up with wood-ſorrel, by the Laplanders kept in caſks under ground, to be eaten in winter, 127; injected into a vien, kills with more certainty than the venom of a viper, iv. 139.

Millipides, multiplied by being cut in pieces, i. 242.

Milo, an inſtance of his ſtrength, when he ſtood upright, i. 294.

Milton makes Satan perſonate the cormorant, a moſt nauſeous bird, iii. 275.

Minerals mere inactive and inſenſible bodies, i. 251.

Miners firſt become paralytic, then die conſumptive, for the trifling reward of ſevenpence a day, i. 51; peculiar contrivance to ſupply light for their operations, 53.

Mines, the deepeſt, that at Cotteberg in Hungary, not more than three thouſand feet deep, i. 36; a coal-mine in the North of England ſaid to be eleven hundred yards deep, 48; air different in them, proportionably as the magazines of fire lay nearer the centre; other cauſes of this difference; Mendip lead-mines in Somerſetſhire; their deſcription, 49, 50; mines of coal generally leſs noxious than thoſe of tin; tin than thoſe of copper; but none are ſo dreadfully deſtructive as thoſe of quickſilver; deplorable infirmities of workmen in the mines near the village of Idra, 51; metallic, often deſtroys all vegetation by their volatile corroſive fumes; ſalt mines naturally cold, 54; natives of countries abounding in mines too often experience the noxious effects of their vicinity, 188; in a lead-mine in Flintſhire were found two grinding teeth, and part of the tuſk of an elephant, at forty-two yards depth, ii. 405.

Mingrelians, among the ſixth variety of the human ſpecies, deſcribed, i. 355.

Mire-drum, the bittern, deſcribed, iii. 242. See *Bittern*.

Miſletoe, a plant, thought propagated by ſeeds voided by birds, iii. 197.

Miſſiſſippi, a great river in North America; its ſource and length, i. 127.

Miſts continually riſe upon the approach of the winter months under the line, i. 217; called froſt ſmoke, raiſes bliſters on the body, in the regions round the poles, 222.

Mite-fly, not found in Lapland, ii. 126.

Miume, a river in America; enormous ſkeletons lately diſcovered near it, ii. 405.

Mock-bird, deſcription of the American mock-bird; its habits; can aſſume the tone of every animal in the wood, from the wolf to the raven, iii. 202.

Mock-ſuns, meteors and other phænomena, in the northern regions, i. 217.

Mococo, firſt of the maki-kind, which is the laſt of the monkeys; its deſcription; a native of Madagaſcar; its qualities, ii. 382; eats its own tail, iii. 22.

Modena, a city in Italy; its remarkable wells; other rarities round it, i. 164.

Mold, black, or garden-earth, the firſt layer on the ſurface of the globe; is formed from animal and vegetable bodies decayed; ſoil fertile, in proportion to the quantity that putrified mold bears to the gravelly mixture, i. 36, 37.

Mole, a ruminating inſect, or ſeemingly ſo, ii. 39; no quadruped fatter, none with a more ſleek gloſſy ſkin; an utter ſtranger in Ireland; formed to live under the earth; its deſcription; the ancients, and ſome moderns of opinion, that the mole was blind; but Derham, by a microſcope, diſcovered all the parts of the eye known in other animals; a mole let looſe in the midſt of a field, like a ghoſt on a theatre, inſtantly ſinks into the earth; peculiar advantage of the ſmallneſs of its eyes; when once buried in the earth, it ſeldom ſtirs out; it chooſes the looſer ſofter grounds; chiefly preys upon worms and inſects; is moſt active, and caſts up moſt earth, immediately before rain, and in winter, before a thaw; in dry weather, it ſeldom forms hillocks; readily evades the purſuit of animals ſtronger and ſwifter than itſelf; deſcription of the mole hill, in which the female has brought forth her young; is ſcarcely found, except in cultivated countries; the varieties are but few; that of Virginia is black, mixed with a deep purple; that of Poland is white; Agricola ſays, he ſaw hats made of mole-ſkins, the fineſt and moſt beautiful imaginable, ii. 303 to 307.

Moloſſian breed of dogs, and its perfections, ſet forth by Nemeſianus, ii. 196.

Molting, annually ſuffered by birds; its effects, iii. 44; artificially accelerated, and how; the manner in which Nature performs the operation, 45.

Molucca iſlands, Ferdinand Magellan, ſlain upon one of them, i. 371.

Mona, the *cephus* of the ancients, a monkey of the ancient continent, ii. 379.

Mona, name given to the marmout in Canada, ii. 279.

Mongooz, of the maki-kind, the laſt of the monkeys; its deſcription, ii. 383.

Monkey, they ſometimes fall a prey to the lion in deſerts and foreſts, ii. 159; one general deſcription will not ſerve for all the animals of the monkey kind, 355; La Condamine aſſerts it would take up a volume to deſcribe the difference of monkeys found along the river of Amazons; and we are ſure that every one of theſe is different from thoſe on the African coaſt; thoſe of two cantons never found to mix; of all kinds leſs than the baboon, have leſs power of doing miſchief, and their ferocity diminiſhes with their ſize; their native woods, are the peſts of other animals, and the maſters of the foreſt where they reſide; the tiger, nor the lion will not venture to diſpute dominion with creatures, who from the tops of trees with impunity carry on an offenſive war, and by their agility eſcape all purſuit; birds have not leſs to fear from their continual depredations; ſuch being their petulant delight in miſchief, that they fling the eggs againſt the ground when wanting appetite to devour them; one only animal in the foreſt ventures to oppoſe them; that is the ſerpent; large ſnakes often wind up the trees where they reſide, and happening to ſurpriſe them ſleeping, ſwallow them whole, before they can make a defence; they generally inhabit the tops of trees, and the ſnakes cling to the branches nearer the bottom, in this manner they are near each other, like enemies in the ſame field of battle; ſome ſuppoſed their vicinity rather argued mutual friendſhip; Father Labat has ſeen them playing their gambols upon thoſe branches on which the ſnakes were repoſing, and jumping over them without receiving any injury; they provoke the ſnake as the ſparrows twitter at a cat; when attacked, they ſhew perfect ſkill in defending and aſſiſting each other, 370 to 372; they regularly begin hoſtilities againſt thoſe who enter their woods; one being wounded, the reſt come round, put their fingers into the wound, as deſirous of ſounding its depth; the blood flowing in any quantity, ſome ſtop it, while others get leaves, chew, and thruſt them into the opening; are often killed in numbers before they make a retreat; in this retreat the young are clinging to the back of the female, who jumps away, ſeemingly unembarraſſed by the burthen; uſual way of taking them alive; ſkinned and ſerved up at negroe feaſts, ſo like a child, an European is ſhocked at the ſight; the negroes ſeeing Europeans buy young and tame monkeys, with equal care brought rats to the factors for ſale, and were greatly diſappointed at finding no purchaſer; they carry off what they are able, and deſtroy ten times more; manner of their plundering; are under a kind of diſcipline, exerciſed among themſelves; accounts to this purpoſe by Morgrave; one ſpecies, by Mr. Buffon called the ouarine, remarkable for loudneſs and diſtinctneſs of voice; uſe to which they convert it; are generally together in companies, march in exact order, and obey the voice of ſome chieftain, remarkable for his ſize and gravity; chief food of the tribe; extraordinary manner of managing an oyſter; manner of drawing crabs from the water; no ſnare, how nicely baited, takes a monkey of the Weſt Indian iſlands; female brings forth one, and ſometimes two at a time; rarely breed when brought into Europe; the male and female never tired of fondling their young, and inſtruct it with no little aſſiduity; often ſeverely correct it, if ſtubborn, or diſinclined to profit by their example, 373 to 376; manner of carrying their young in the woods; dexterity in paſſing from one tree to another, by forming a kind of chain, locking tail in tail, or hand in hand; one amuſed itſelf for hours impoſing upon the gravity of a cat; and playing its pranks among rabbits; faithful ſervices which Father Carli received from the monkeys in Angola, where he went to convert the ſavage natives to Chriſtianity; ſavages of Africa and America, ſuppoſe monkeys to be men; idle, ſlothful, rational beings, capable of ſpeech and converſation, but obſtinately dumb, for fear of being compelled to labour; monkeys of Africa moſt expert and entertaining;

ſhow a greater degree of cunning and activity; three marks by which monkeys of the new continent are diſtinguiſhed from thoſe of the old; Mr. Buffon makes but nine ſpecies of monkeys belong to the ancient continent, and eleven to the new; their names, with their deſcriptions; the *red African*, the *patas*, ſecond ſort of the ancient continent; the *white noſe*, or *mouſtoc*, of the ancient continent, moſt beautiful; its deſcription; the *green* of St. Jago, alſo called *callitrix*, is of the ancient continent; its deſcription; ſome of the kinds eat their own tail, and ſeem to feel no pain; the Bramins have hoſpitals for thoſe that happen to be ſick, or diſabled; thoſe monkeys of the new continent, with muſcular holding tails, are called ſapajous, and thoſe with feeble uſeleſs tails, are called ſagoins; *fox-tailed* monkey; *makies*, the laſt of the kind; their deſcription, 377 to 382.

Monkey-bezoar, a factitous concrete, ii. 78. See *Bezoar.*

Monoculus, the arboreſcent water-flea; its deſcription; are of a blood-red colour; and ſometimes in ſuch multitudes on ſtanding waters, as to make them appear all over red, whence the water has been thought turned into blood, iv. 184.

Monſoons, ſo called from a famous Pilot of that name, who firſt uſed them in navigation with ſucceſs; in that part of the ocean between Africa and India thoſe of the eaſt winds begin in January, and end at the commencement of June; in Auguſt, or September, the contrary takes place; and the weſt winds blow for three or four months, i. 200; monſoons prevail at different ſeaſons, throughout the Indies, 207.

Monſters, after a catalogue of them, Linnæus particularly adds the ſlender waiſts of the women of Europe, i. 362.

Monſtrous productions, Father Malbrance's ingenious theory of; remarkable inſtance related by him, i. 363.

Mooſe-deer, name in America for the elk, ii. 113; its deſcription, 115.

Mormyrus, deſcription of this fiſh, iii. 404.

Morocco, the original horſes there, much ſmaller than the Arabian breed, ii. 16.

Moron, a kind of ſalamander, though venomous, iv. 107.

Morſe, an animal of the ſeal-kind, might be ranked among the fiſhes, i. 400; generally frequents the ſame places where ſeals reſide in; different from the reſt in a very particular formation of the teeth; reſembles a ſeal, except that it is much larger; are rarely found, but in the frozen regions near the pole; its teeth generally from two to three feet long; the ivory more eſteemed than that of the elephant; the fiſhers have formerly killed three or four hundred morſes at once; their bones are ſtill lying in prodigious quantities, along thoſe ſhores they chiefly frequented, ii. 351.

Mochittoes, exceſſive torments cauſed by them, i. 88.

Moſs, the only ſupport of the rein-deer in Lapland; of two ſorts, ii. 120.

Mother-of-pearl, taken from the pearl oyſter, iv. 62.

Moths, difference from butterflies, iv. 245.

Motion, keeps the water of the ſea ſweet, i. 145; deſtroys numbers of viler creatures, 146; conſtant motion of the waters of the ſea weſtward 151; principal difference between ſerpentine and vermicular motion, iv. 129; ſome vegetables poſſeſſed of motion, 307; and many animals totally without it; in what manner animals of the worm kind move, 310.

Moufflon, the ſheep in a ſavage ſtate, a bold, fleet creature, able to eſcape from greater animals, or oppoſe the ſmaller; its deſcription, ii. 58.

Mountains, riſing from places once level, i. 20; give direction to the courſes of the air, 195; how formed and for what deſigned; upon our globe conſidered as angles of ſmall lines in the circumference of a circle, 83, 84; countries moſt mountainous, are moſt barren and uninhabitable, 88; ſome vallies are fertilized by earth waſhed down from great heights, 97; the more extenſive the mountain, the greater the river, 86; tops of the higheſt mountains bare and pointed, and why, 93; tops of land-mountains appear barren and rocky, of ſea-mountains verdant and fruitful, 169; the higheſt in Africa, thoſe called *of the moon*, giving ſource to the Niger and Nile in Africa, the greateſt and higheſt under the line; ſome riſe three miles perpendicular above the bottom of the ocean, 86 to 88; higheſt in Aſia; Mount Caucaſus makes near approaches to the Andes in South America, 92; burning in Europe, 57; in Aſia; in the Molucca Iſlands; in Africa; in America; thoſe of the Andes; thoſe of Arequipa, Caraſſa, Malahallo, and Cotopaxi, 62; deſcription of the latter by Ulloa, and an eruption of it, 63.

Mouſe, the moſt feeble, and moſt timid of all quadrupeds, excepe the Guinea-pig; never rendered quite familiar; though fed in a cage retains its apprehenſions; no animal has more enemies, and few ſo incapable of reſiſtance; the owl, cat, ſnake, hawk, weazel, and rat deſtroy them by millions; brings forth at all ſeaſons, and ſeveral times in the year; its uſual number from ſix to ten; theſe in a fortnight ſtrong enough to ſhift for themſelves; places where chiefly found; Ariſtotle, having put a mouſe with young into a veſſel of corn, ſome time after found a hundred and twenty ſprung from that original; its life laſts two or three years; the ſpecies found in all parts of the ancient continent, and has been exported to the new; Geſner minutely deſcribes the variety of mouſe-traps; long-tailed field mouſe; ſhort-tailed field-mouſe; has a ſtore againſt winter, a buſhel at a time; a deſcription of the ſhrew-mouſe, ii. 293, 294.

Mouſtoc, or *white-noſe*, monkey of the ancient continent; its deſcription, ii. 380.

Mouth of hares lined with hair; the only animals that have it on the inſide, ii. 225; the ſnails of the trochus kind have none, iv. 50.

Mucous liquor, giving the joints an eaſy and ready play, i. 337.

Mugil, the mullet, deſcription of this fiſh, iii. 401.

Mule, reputed barren, though Ariſtotle ſays it is ſometimes prolific, ii. 24; engendered between a horſe and a ſhe-aſs, or a jack-aſs and a mare, 29; inhabitants of mountainous countries cannot do without them; how they go down the precipices of the Alps and Andes; a fine mule in Spain worth fifty or ſixty guineas; common mule very healthy; lives thirty years and more, 30; in South America deſtroyed by a bat called vampyre, 332.

Mullus, or *ſurmulet*, a deſcription of this fiſh, iii. 400.

Multivalve ſhells, third diviſion of ſhells by Ariſtotle, iv. 39; two principal kinds of multivalve ſhell-fiſh, moving and ſtationary, 65.

Mummy, formerly a conſiderable article in medicine; Paræus wrote a treatiſe on the inefficacy of mummy in phyſic; counterfeited by the Jews, and how; the method of ſeeking for mummies; found in the ſands of Arabia, in Egypt, in wooden coffins, or in clothes covered with bitumen, i. 381, 382; remarkable mummy dug up at Auvergne, in France, 384; an injection of petreoleum inwardly, and a layer of aſphaltum without, ſuffice to make a mummy, 386.

Muræna, the eel, its deſcription, iii. 402.

Murena of the ancients, not our lamprey, iii. 380.

Muralto. See *Lamprey*, iii. 381.

Muſcardin, name or the leſſer dormouſe, by Mr. Buffon, ii. 295.

Muſcles to judge of the ſtrength of animals by the thickneſs of their muſcles, inconcluſive, i. 295; thoſe of the hare are ſtrong and without fat, ii. 256; the pectoral muſcles of quadrupeds trifling in compariſon to thoſe of birds; in quadrupeds, as in man, the muſcles moving the thighs and hinder parts are ſtrongeſt, while thoſe of the arms are feeble; in birds, the contrary obtains, iii. 39; thoſe of the ſhark preſerve their motion after being ſeparated from the body, 367.

Muſcle, the ſhell-fiſh, its deſcription; its organs of generation are what moſt deſerve to excite our curioſity; it endeavours to become ſtationary, and to attach itſelf to any fixed object it happens to be near; its enemies; it is ſuppoſed that thoſe threads, which are uſually called the beard of the muſcle, are the natural growth of the animal's body, and by no means produced at pleaſure, as Reaumur ſuppoſes; its inſtrument of motion, by which it contrives to reach the object it wants to bind itſelf to; its food; ſome of this kind have been found a foot long; the natives of Palermo ſometimes make gloves and ſtockings of its beards; the places where found; it requires a year for the peopling a muſcle-bed, iv. 55 to 58.

Muſcovy-duck, or *muſk-duck*, ſo called from a ſuppoſed muſky ſmell, iii. 308.

Muſic, ſaid, by the ancients, to have been invented from the blows of different hammers on an anvil; in all countries, where muſic is in its infancy, the half-tones are rejected; many barbarous nations have their inſtruments of muſic; and the proportion between their notes is the ſame as in ours; all countries pleaſed with muſic, and where they have not ſkill to produce harmony, they ſubſtitute noiſe; its effects; the ancients give us many ſtrange inſtances of them upon men and animals; and the moderns likewiſe; madneſs cured by it; and alſo excited by it; remarkable inſtance in Henry IV. of Denmark; fiſhes are allured by muſic; horſes and cows likewiſe, i. 320 to 323; the elephant appears delighted with muſic, ii. 392; Father Kircher has ſet the voices of birds to muſic, iii. 111.

Muſk, among the numerous medicines procurable from quadrupeds, none, except the muſk and hartſhorn have preſerved a degree of reputation, ii. 74; a doubt whether the animal producing it be a hog, an ox, a goat, or a deer; no animal ſo juſtly the reproach of natural hiſtorians as that which bears the muſk; it has been variouſly deſcribed, and is known very imperfectly; the deſcription given by Grew; formerly in high requeſt as a perfume; has for more than a century been imported from the Eaſt; is a duſky reddiſh ſubſtance, like coagulated blood; a grain of it perfumes a whole room; its odour continues for days, without diminution, and no ſubſtance known has a ſtronger or more permanent ſmell; in larger quantities it continues for years, and ſcarce waſted in weight, although it has filled the atmoſphere to a great diſtance with its parts; the bags of muſk from abroad ſuppoſed to belong to ſome other animal, or taken from ſome part of the ſame, filled with its blood, and enough of the perfume to impregnate the reſt; it comes from China, Tonquin, Bengal, and often from Muſcovy; that of Thibet reckoned the beſt, and of Muſcovy the worſt, 84 to 87.

Muſk-rat, three diſtinctions of it, ii. 296.

Muſky ſmell, does not make the characteriſtic marks of any kind of animals, ii. 54.

Muſmon or *muſflon*, reſembles a ram, its deſcription, ii. 63.

Myoides, a broad thin ſkin, covering the whole upper fore-part of the body, its effect in women with child, i. 287.

N

Nails, how formed in man; thoſe of ſome of the learned men in China longer than their fingers; ſavages that let them grow long, uſe them in fleaing animals, i. 285 to 288.

Nanquin, a river in Aſia, receives thirty rivers, i. 128.

Narwhale, the ſea-unicorn, its deſcription; errors concerning the teeth of this animal; the moſt harmleſs and peaceful inhabitant of the ocean; the Greenlanders call it the fore-runner of the whale, and why; its food; is a gregarious animal; a century ago, its teeth conſidered the greateſt rarity in the world; they far ſurpaſs ivory in its qualities, iii. 350 to 252.

Natolian Goat, a remarkable variety in the goat kind, ii. 68.

Nature laviſh of life in the lower orders of the creation, i. 257; has brought man into life with more wants and infirmities than the reſt of her creatures, 297; in a courſe of ages ſhapes herſelf to conſtraint and aſſumes hereditary deformity; inſtances of it, 360; has contracted the ſtomachs of animals of the foreſt, ſuitable to their precarious way of living, 298; has left no part of her fabric deſtitute of inhabitants, iii. 35; what might have led ſome late philoſophers into the opinion that all Nature was animated, iv. 327.

Nautilus, a ſea-ſnail, moſt frequently ſeen ſwimming; its ſhell very thin, and eaſily pierced; its deſcription, iv. 52.

Nazareth bird, whether the dodo or not is uncertain, iii. 76.

Neck, fiſhes have none; birds, in general, have it longer than any other kind of animals, i. 285; in women, it is proportionably longer than in men, 289.

Nectareum, the part of a flower from which the honey is extracted, iv. 263.

Negroes of the Leeward Iſlands, by the ſmell alone, diſtinguiſh the footſteps of a Frenchman from thoſe of a Negro, i. 328; ſeveral of them have white beards and black hair; deſcribed; their features not deformed by art; the women's breaſts, after bearing one child, hang down below the navel, and are thrown over the ſhoulders to ſuckle the child at their backs, 354; the jet black claim the honour of hereditary reſemblance to our common parent; an argument ſufficient to prove the contrary; two white Negroes the iſſue of black parents, 360, 361; ſhow their terror and ſurpriſe when they firſt ſee a horſe, ii. 8; of the African coaſts regard the bat with horror, and will not eat it though ready to ſtarve, 330; happy to ſee numbers of monkeys deſtroyed, becauſe they dread their devaſtations, and love their fleſh; cannot comprehend advantages ariſing to Europeans from educating or keeping monkeys; and having ſeen young and tame monkeys bought, have offered rats for ſale to our factors, and been greatly diſappointed at finding no purchaſer; diſtractedly fond of the fleſh of the ſhark, 314; their manner of killing it, iii. 368, 369.

Negroland, or *Nigritia*, the plague not known in it, i. 190.

Nerves, wherever they go, or ſend their branches in number, theſe parts are ſooneſt begun, and moſt completely finiſhed, i. 310.

Neſs, or *Nethe*, a river near Bruges, in Flanders; great quantities of trees found in its mouth, at the depth of fifty feet, i. 163.

Neſt, of every ſpecies of birds has a peculiar architecture; where eggs are numerous, the neſt muſt be warm, iii. 47; different places which birds chooſe for their neſts, 48; deſcription of the neſt of an eagle found in the Peak of Derbyſhire, 84; of the bald eagle, large enough to fill the body of a cart, 86; hanging neſts in Braſil, 165; made in ſuch a manner, as to have no opening but at the bottom, 167; the Chineſe get thoſe of the ſwallows from the rocks, and ſell them in great numbers in the Eaſt Indies, where they are eſteemed great delicacies, and eat diſſolved in chicken or mutton broth, 215; that of the waſp one of the moſt curious objects in natural hiſtory; its deſcription, iv. 275, 276.

Netherlands, their inhabitants improved us in the woollen manufacture, ii. 60.

Nettles, how uſed to teach capons to clutch a freſh brood of chickens throughout the year, iii. 123.

Nettles of the ſea, name given by ſome to the ſtar-fiſh, iv. 314.

Nicola Peſce, a celebrated diver; his performances related by Kircher; he often ſwam over from Sicily into Calabria, carrying letters from the king; frequently known to ſpend five days in the midſt of the waves, i. 170.

Nieper, or *Boriſthenes*, a river riſing in the middle of Muſcovy, and running three hundred and fifty leagues to empty itſelf in the Black Sea, i. 124.

Niger, this river has a courſe of ſeveral hundred miles from its ſource, at the Mountains of the Moon, i. 86; confidently aſſerted that it is loſt before it reaches the ocean, 132.

Nightingale, a bird of the ſparrow kind, iii. 199; deſcription of its melody by Pliny; its reſidence; for weeks together, undiſturbed, it ſits upon the ſame tree; its neſt and eggs; its ſong in captivity not ſo alluring; Geſner ſays it is poſſeſſed of a faculty of talking; ſtory related by him in proof of this aſſertion; its food, and in what manner they muſt be kept; manner of catching the nightingale, and of managing them when caught, 201 to 209.

Nile, its courſe; its ſources aſcertained by miſſionaries; takes its riſe in the kingdom of Goiam; receives many leſſer rivers; Pliny miſtaken, in ſaying that it received none; the cauſe of its annual overflowings; time of their increaſe and decreaſe more inconſiderable now than in the time of the ancients, i. 125, 126.

Noiſe, the mind prediſpoſed to joy, noiſe fails not to increaſe it into rapture; and thoſe nations which have not ſkill enough to produce harmony, readily ſubſtitute noiſe; loud and unexpected diſturbs the whole frame, and why, i. 321.

Noſe, that of the Grecian Venus, ſuch as would appear at preſent an actual deformity, i. 271; the form of the noſe, and its advanced poſition, peculiar to the human viſage; among the tribe of ſavage men, the noſe is very flat; a Tartar ſeen in Europe with little more than two holes through which to breathe, 278; whence originally may have come the flat noſes of the blacks, 360.

Noſtrils, wide, add a great deal to the bold and reſolute air of the countenance, i. 278; of the cetaceous tribe, iii. 337; two in the great Greenland whale, 343.

Notonecta, the common water-fly; ſwims on its back, to feed on the under ſide of plants growing in water, iv. 221.

Numidian bird, or Guinea-hen, deſcribed, iii. 135.

Numidian crane; its peculiar geſtures and contortions, iii. 236.

Nux vomica, ground and mixed with meal, the moſt certain poiſon, and leaſt dangerous, to kill rats, ii. 292; fatal to moſt animals, except man, iii. 124.

Nyl-ghaw, an animal between the cow and the deer, native of India; its deſcription; diſpoſitions and manners of one brought over to this country; its manner of fighting; at all our ſettlements in India, conſidered as a rarity, iii. 13, 14.

O

Oaks of Hatfield Chaſe Levels, as black as ebony, very laſting and cloſe grained, ſold for fifteen pounds a-piece, i. 165.

Objects. See *Eye*.

Oby, in Tartary, a river of five hundred leagues, running from the lake of Kila, into the Northern Sea, i. 124; receives about ſixty rivers 128.

Ocean, occupies conſiderably more of the globe than the land; its different names; all the rivers in the world flowing into it, would, upon a rude computation, take eight hundred years to fill it to its preſent height, i. 133, 134; ſavages conſider it as an angry deity, and pay it the homage of ſubmiſſion; the bays, gulphs, currents, and ſhallows of it much better known and examined than the provinces and kingdoms of the earth, and why; when England loſes its ſuperiority there, its ſafety begins to be precarious, 136; opinions concerning its ſaltneſs, and that of Boyle particularly, 137; winds never change between the tropics in the Atlantic and Ethiopic Oceans, 196; each has its inſects and vegetables, 234.

Ocelot, or catamountain, its deſcription, ii. 176; of the panther kind; one of the fierceſt, and, for its ſize, one of the moſt deſtructive animals in the world, 179.

Ocotzimtzcan, a kind of pigeon, one of the moſt ſplendid tenants of the Mexican foreſts, iii. 187.

Ohio, ſeveral enormous ſkeletons five or ſix feet beneath the ſurface on the banks of that river, lately diſcovered, ii 405.

Oil, the oil of the fiſh called cachelot is very eaſily converted into ſpermaceti, iii. 355; the porpeſſe yields a large quantity of it, 359; by the application of olive oil, the viper's bite is effectually cured, iv. 142.

Olive colour, the Aſiatic of that colour claims the honour of the hereditary reſemblance to our common parent, i. 360.

Oliver, (*William*) the firſt who diſcovered that the application of olive oil cured the viper's bite effectually, iv. 142.

Onager, or the wild aſs, is in ſtill greater abundance than the wild horſe, ii. 24.

Ondatra, one of the three diſtinctions of the muſk-rat; a native of Canada; creeps into holes where others ſeemingly leſs cannot follow; the female has two diſtinct apertures, one for urine, the other for propagation; this animal, in ſome meaſure, reſembles the beaver; its manner of life during winter, in houſes covered under a depth of eight or ten feet of ſnow; ſavages of Canada cannot abide its ſcent, call it ſtinkard; its ſkin very valuable, ii. 296, 297.

Onza, or ounce, of the panther kind; the onza of Linnæus, ii. 175.

Ophidium, the gilthead, by ſailors called the dolphin, its deſcription, iii. 399.

Opoſſum, the female's belly found double; when purſued, ſhe inſtantly takes her young into a falſe belly nature has given her, and carries them off, or dies in the endeavour, i. 413; an animal in North and South America, of the ſize of a ſmall cat, and of the monkey kind; its deſcription, ii. 355, 384; a minute deſcription of it; the young, when firſt produced, are very ſmall, and immediately on quitting the real womb, they creep into the falſe one, but the time of continuing there is uncertain; Ulloa has found five young hidden in the belly of the dam, alive and clinging to the teat, three days after ſhe was dead; chiefly ſubſiſts upon birds, and hides among the leaves of trees to ſeize them by ſurpriſe; cannot run with any ſwiftneſs, but climbs trees with great eaſe and expedition; it often hangs by the tail, and for hours together, with the head downwards, keeps watching for its prey; by means of its tail, flings itſelf from one tree to another, hunts inſects, and eſcapes its purſuers; eats vegetable as well as animal ſubſtances; is eaſily tamed, but a diſagreeable domeſtic, from its ſtupidity, figure, and ſcent, which, though fragrant in ſmall quantities, is ungrateful when copious; during its geſtation, the bag in which the young are concealed may be opened and examined without inconvenience, the young may be counted and handled, they keep fixed to the teat, and cling as firm as if they made a part of the body of the mother, 384 to 386.

Orb, deſcription of the ſea-orb, alſo called the ſea-porcupine; is abſolutely poiſonous, if eaten, iii. 391, 392.

Ore of tin is heavier than that of other metals, i. 49.

Organs of digeſtion, in a manner, reverſed in birds, iii. 43.

Organs of generation in fiſhes, iii. 333.

Orifices, or different verges of ſnails, iv. 49.

Orkney Iſlands, on their ſhores the ſea, when agitated by ſtorms, riſes two hundred feet perpendicular, i. 158.

Oroonoko, a river in South America, its ſource and length, i. 127.

Ortolan, a bird of the ſparrow kind, iii. 197.

Oſprey, its fleſh liked by many, and, when young, an excellent food, according to Belonius, iii. 80.

Oſtiac Tartars, a race that have travelled down from the north, i. 349.

Oſtracion, a fiſh of the cartilaginous kind, is poiſonous, iii. 392.

Oſtrich, manner in which the Arabians hunt them, ii. 9, and iii. 67; an Arabian horſe of the firſt ſpeed ſcarcely outruns them, 9; its fleſh proſcribed in Scripture as unfit to be eaten; the greateſt of birds; makes near approaches to the quadruped claſs; its deſcription; appears as tall as a man on horſeback; brought into England above ſeven feet high; ſurpriſing conformation of its internal parts; a native only of the torrid regions of Africa; not known to breed elſewhere than where firſt produced; places they inhabit; the Arabians ſay it never drinks; will devour leather, glaſs, hair, iron, ſtones, or any thing given; in native deſerts, leads an inoffenſive ſocial life; Thevenot affirms the male keeps to the female with connubial fidelity; thought much inclined to venery; ſome of their eggs weigh fifteen pounds; lay from forty to fifty eggs at one clutch; none has a ſtronger affection for her young; aſſiduous in ſupplying the young with graſs, and careful to defend them, encountering every danger boldly; way of taking them among the ancients; the plumes uſed in their helmets; feathers plucked from the animal while alive more valued than thoſe taken when dead; ſome ſavage nations of Africa hunt them for their fleſh; a ſingle egg ſufficient entertainment for eight men; eggs well taſted, and extremely nouriſhing; of all chaſes, that of the oſtrich, though moſt laborious, the moſt entertaining; uſe they make of its ſkin; its blood mixed with the fat a great dainty with the Arabians; inhabitants of Dara and Lybia breed flocks of them; tamed with little trouble; prized for more than feathers in this domeſtic ſtate; often ridden upon and uſed as horſes; Moore aſſures us he ſaw a man at Joar travelling upon an oſtrich; and Adanſon aſſerts he had two young oſtriches, the ſtrongeſt of which ran ſwifter than the beſt Engliſh racer, with two Negroes on his back; of all animals uſing wings with legs in running, theſe are by far the ſwifteſt; the American oſtrich, iii. 61 to 69.

Otter of roſes, a modern perfume, valued for its vegetable fragrance, ii. 248.

Otter, the link between land and amphibious animals, reſembles terreſtrial in make, and aquatic in living; ſwims faſter than it runs; is brown, and like an overgrown weaſel; its deſcription; voracious animal found near lakes; not fond of fiſhing in running water, and why; when in rivers, always ſwims againſt the ſtream, to meet rather than purſue the fiſh it preys upon; in lakes, deſtroys more than it devours, and ſpoils a pond in a few nights; tears to pieces the nets of the fiſhers; two different methods of fiſhing practiſed by it; infects the edges of lakes with the dead fiſh it leaves; often diſtreſſed for proviſions in winter, when lakes are frozen, and then obliged to live upon graſs, weeds, and bark of trees; its retreat the hollow of a bank made by the water; there it forms a gallery ſeveral yards along the water; deſcription of its habitation; way of training it up to hunt fiſh, and, at the word of command, drive them up to the corner of a pond, ſeize the largeſt, and brings it in its mouth to its maſter; marks of its reſidence; bites with great fierceneſs, and never lets go its hold; brings forth its young under hollow banks upon beds of ruſhes, flags, or weeds; manner of taking the young alive; how fed when taken; ſome dogs trained up to diſcover its retreat; otters met with in moſt parts of the world; in North America and Carolina found white, inclining to yellow; deſcription of the Braſilian otter, ii. 333.

Ovaria, two glandular bodies near the womb, reſembling the cluſter of ſmall eggs found in fowls, i. 239.

Ouarine, ſpecies of the monkeys, ſo called by Mr. Buffon, remarkable for the loudneſs of their voice, and the uſe to which they apply it, ii. 375.

Oviparous animals, diſtinguiſhed from the viviparous, the two claſſes for generation; all other modes held imaginary and erroneous, i. 242.

Ouran-outang, the wild man of the wood, an animal nearly approaching the human race, is the foremoſt of the ape kind; this name given to various animals walking upright, but of different countries, proportions, and powers; the troglodyte of Bontius, the drill of Purchas, and the pigmy of Tyſon, have received this general name; its deſcription in a comparative view with man; gigantic races of it deſcribed by travellers truly formidable; many are taller than man, active, ſtrong, intrepid, cunning, laſcivious, and cruel; countries where found, in Borneo, the quality courſe him as we do the ſtag, and this hunting is a favourite amuſement of the king; runs with great celerity; its deſcription; Battel calls him pongo, aſſures us that in all he reſembles man, but is larger to a gigantic ſtate; a native of the tropical climates; he lives upon fruits, and is not carnivorous; goes in companies, and this troop meeting one of the human ſpecies without ſuccour, ſhew him no mercy; they jointly attack the elephant, beat him with clubs, and force him to leave that part of the foreſt they claim as their own; is ſo ſtrong that ten men are not a match for him; none of the kind taken but very young; one of them dying, the reſt cover the body with leaves and branches; a Negro boy taken by one of theſe, and carried into the woods, continued there a whole year without any injury; they often attempt the female Negroes going into the woods, and keep them againſt their wills for their company, feeding them plentifully all the time; a traveller aſſures, that he knew a woman of Loango that lived among them for three years; they build ſheds, and uſe clubs for their defence; ſometimes walk upright, and ſometimes upon all fours, when fantaſtically diſpoſed; though it reſembles man in form, and imitates his actions, it is inferior in ſagacity even to the elephant or the beaver; two of theſe creatures brought to Europe diſcovered an aſtoniſhing power of imitation, ſat at table like men, eat of every thing without diſtinction, made uſe of knife, fork, and ſpoon, drank wine and other liquors; the male of theſe two creatures being ſea-ſick, was twice bled in the arm, and afterwards, when out of order, he ſhewed his arm as deſirous of relief by bleeding; another was ſurpriſingly well behaved, drank wine moderately, and gladly left it for milk, or other ſweet liquors; it had a defluxion upon the breaſt, which increaſing cauſed its death in the ſpace of one year from its arrival, ii. 355 to 364.

Ounce, or onza, remarkable for being eaſily tamed, and employed all over the Eaſt for the purpoſes of hunting, ii. 83; diſtinguiſhed from the panther, the ounce of Linnæus, 175; does not purſue by the ſmell like thoſe of the dog kind, 179.

Owl, deſcription of the common horned owl; the ſkreech-owl, and its diſtinctive marks, iii. 81; common mark by which all birds of this kind are diſtinguiſhed from others; general characteriſtics of birds of the owl kind; though dazzled by a bright day-light, they do not ſee beſt in darkeſt nights, as imagined; ſeeing in the night, or being dazzled by day, not alike in every ſpecies of this kind; deſcription of the great horned owl; names of ſeveral owls without horns; theſe horns nothing more than two or three feathers that ſtand up on each ſide of the head over the ear; father Kircher having ſet the voices of birds to muſic, has given all the tones of the owl note, which make a moſt tremendous melody; ſometimes bewildered; what they do in that diſtreſs; averſion of the ſmall birds to the owl; how they injure and torment him in the day-time; ſport of bird-catchers by counterfeiting the cry of the owl; in what manner the great horned owl is uſed by falconers to lure the kite, when wanted for training the falcon; places where the great horned owl breeds; its neſt, and number of eggs; the leſſer owl takes by force the neſt of ſome other bird; number of eggs; the other owls build near the place where they chiefly prey; a ſingle owl more ſerviceable than ſix cats, in ridding a barn of mice; an army of mice devoured at Hallontide by a number of ſtrange painted owls; are ſhy of man, extremely untractable, and difficult to tame; the white owl in captivity refuſes all nouriſhment, and dies of hunger; account of Mr. Buffon to this purpoſe, 107 to 113.

Ox, its eyes are brown, i. 275; on the fertile plains of India it grows to a ſize four times as large as the ſame kind bred in the Alps, 359.

Oxney, an iſland near Romney Marſh, in what manner produced, i. 160.

Oyſters, a horſe known to be fond of oyſters, i. 408; ſurpriſing manner in which monkeys manage an oyſter, ii. 376; bivalved ſhell-fiſh are ſelf-impregnated; they are depoſited in beds where the tide comes in, at Colcheſter, and other places of the kingdom; theſe ſaid to be better taſted; amazing ſize of oyſters along the coaſt of Coromandel, iv. 58 to 60; the pearl oyſter has a large whitiſh ſhell, the internal coat of which is the mother of pearl, 62.

P.

Paca, improperly called American rabbit, an animal of South America; its cry, and manner of eating; is moſt like the agouti, yet differs in ſeveral particulars; its deſcription; places where generally found; its fleſh conſidered as a delicacy, and often ſkin and all, like a young pig; is ſeldom taken alive, defending itſelf to the laſt extremity; perſecuted not only by man, but by every beaſt and bird of prey; breeds in ſuch numbers, the diminution is not perceptible, ii. 281, 282.

Pachomac deſerts, where the formidable bird condor is chiefly ſeen, men ſeldom venture to travel, iii. 91.

Pacific ſea, the winds never change in it, i. 196.

Pacos, a kind of camel in South America; its wool very valuable, iii. 13.

Paddock-moon, the ſilence of frogs in dry weather, may ſerve to explain an opinion, that there is a month in the year ſo called, in which they never croak, iv. 79.

Pain, nothing but repeated experience ſhows how ſeldom pain can be ſuffered to the utmoſt, i. 344.

Paleneſs, often the effect of anger, i. 280.

Palm-tree, the elephant eats the ſhoots and branches to the ſtump, ii. 393.

Pambamarca, mountains at Quito in Peru; a very uncommon meteor ſeen upon it by Ulloa, i. 220.

Pangolin, vulgarly the ſcaly lizard, is a native of the torrid climates of the ancient continent; of all animals the beſt protected from external injury; its deſcription; at the approach of an enemy, it rolls itſelf up like the hedge-hog; the tiger, panther, and hyæna, make vain attempts to force this animal, when it rolls itſelf up like the hedge-hog; its fleſh is conſidered by the Negroes of Africa as a great delicacy; it has no teeth; lives entirely upon inſects; there is not a more harmleſs inoffenſive creature than this, unmoleſted; countries where found, ii. 317 to 320.

Panther, the foremoſt of the miſchievous ſpotted kind, by many naturaliſts miſtaken for the tiger; the panther of Senegal; the large panther; difference between theſe two; that of America, or jaguar, compared with the two former, ii. 173, 174; ſometimes employed in hunting; the gazelle or leveret are its prey; it ſometimes attacks its employer, 178.

Parr, a peaſant, lived to a hundred and forty-four, without being abſtemious, i. 340.

Paradiſe-bird, few have more deceived and puzzled the learned than this; it is an inhabitant of the Molucca Iſlands; erroneous reports concerning this bird, and what has given riſe to them; the native ſavages of thoſe iſlands carefully cut off its legs before they bring it to market, and why; two kinds of the bird of paradiſe; their diſtinction from other birds; the deſcription of this bird; found in great number in the iſland of Aro, where the inhabitants call it God's bird; live in large flocks, and at night perch upon the ſame tree; are called by ſome the ſwallows of Ternate, and, like them, have their ſtated times of return; their king diſtinguiſhed from the reſt by the luſtre of his plumage, and the reſpect and veneration paid to him; killing the king, the beſt chance of getting the flock; the chief mark to know the king is by the ends of the feathers in the tail, having eyes like thoſe of the peacock; how this bird breeds, or what the number of its young, remains for diſcovery; for beauty it exceeds all others of the pie-kind, iii. 167 to 170.

Parakeets. See *Parrot.*

Parana, a river in South America, wherewith at eight hundred leagues from its ſource, the Plata runs to its mouth, i. 127.

Paraſina, name given by the Italians to a fiſhing-line, not leſs than twenty miles long; baited with ten or twelve thouſand hooks, and ſunk to the bottom along the coaſt in the Mediterranean for that fiſhing called the peilago, iii. 374.

Paraſite plants, not able to ſupport themſelves, grow and fix upon ſome neighbouring tree, i. 236.

Parrot, the middle or ſecond ſize of the kind deſcribed; the eaſe with which this bird is taught to ſpeak, and the number of words it is capable of repeating are ſurpriſing; a grave writer affirms, that one of theſe was taught to repeat a whole ſonnet from Petrarch; the author has ſeen one taught to pronounce the ninth commandment articulately; account of a parrot belonging to Henry VII.; Linnæus makes its varieties amount to forty-ſeven, Briſſon extends his catalogue to ninety-five, and the author thinks them numberleſs; peculiarities obſerved in their conformation; common enough in Europe, will not, however, breed here; inſtances of ſagacity and docility, particularly of the great parrot called *aicurous*; their habits; their neſts and the number of eggs; uſual method of taking the young; always ſpeak beſt when not accuſtomed to harſh, wild notes; in France very expert, but nothing to thoſe of Braſil, which, Clauſius ſays, are moſt ſenſible and cunning; natives of Braſil ſhoot them with heavy arrows, headed with cotton, which knock down the bird without killing it; thoſe of the parakeet tribe are delicate eating; of this kind in Braſil, Labat aſſures there are the moſt beautiful in plumage, and the moſt talkative poſſible; are reſtleſs, and ever on the wing; their habits; their outcry when their companions fall; are very deſtructive on the coaſt of Guinea; more than a hundred different kinds counted on the coaſt of Africa; the white ſort called lories; countries where found; one, north of the Cape of Good Hope, takes its name from the multitude of parrots in its woods; a hundred kinds now known, not one of which naturally breeds in countries that acknowledged the Roman power; the green parakeet, with a red neck, was the firſt of the kind brought into Europe, and the only one known to the ancients from Alexander the Great to Nero; diſorders peculiar to the parrot kind; one well kept will live five or ſix and twenty years, iii. 174 to 182.

Partridges, in England, a favourite delicacy at the tables of the rich, whoſe deſire of keeping them to themſelves, has been gratified with laws for their preſervation, no way harmonizing with the general ſpirit of Engliſh legiſlation, and why; there are two kinds, the grey and the red; the grey is moſt prolific, and always keeps on the ground; the red leſs common, and perches upon trees; the partridge is ſound in every country, and climate; in Greenland, where it is brown in ſummer, becomes white in winter; thoſe of Barakonda are larger legged, ſwiſter of foot, and reſide in the higheſt rocks; partridges of all ſorts agree in one character, being immoderately addicted to venery, often to an unnatural degree; the male purſues the hen to her neſt, and breaks her eggs rather than be diſappointed; the young having kept in flocks during the winter, break ſociety in ſpring, when they begin to pair, and terrible combats enſue; their manners otherwiſe reſemble thoſe of poultry, but their cunning and inſtincts are ſuperior; means the female uſes to draw away any formidable animal that approaches her neſt; the covies are from ten to fifteen, and, unmoleſted, they live from fifteen to ſeventeen years; method of taking them in a net, with a ſetting-dog, the moſt pleaſant, and moſt ſecure; they are never ſo tame as our domeſtic poultry, iii. 142 to 144.

Paſſions, moſt of the furious ſort characterized from the elevation and depreſſion of the eye-brows, i. 276; freedom from paſſions not only adds to the happineſs of the mind, but preſerves the beauty of the face, 338.

Paſtures, thoſe of Great Britain excellently adapted to the cow kind, ii. 41.

Patas, by ſome called the red African monkey; its deſcription, ii. 379.

Paul (St.) in Lower Britanny. See *Sand*.

Paunch, name of the firſt ſtomach of ruminating animals, ii. 38.

Pazan, name of the eighth variety of gazelles, by Mr. Buffon, ii. 77.

Peacock, a ſaying among the ancients, as beautiful as is the peacock among birds, ſo is the tiger among quadrupeds, ii. 164; varieties of this bird, ſome white, others creſted; that of Thibet, the moſt beautiful of the feathered creation; our firſt were brought from the Eaſt Indies, and they are ſtill found in flocks in a wild ſtate in the iſlands of Java and Ceylon; the common people of Italy ſay it has the plumage of an angel, the voice of a devil, and the guts of a thief; in the days of Solomon we find his navies imported from the Eaſt apes and peacocks; Ælian relates they were brought into Greece from ſome barbarous country, and that a male and female were valued at thirty pounds of our money; it is ſaid alſo, that when Alexander was in India, he ſaw them flying wild on the banks of the river Hyarotis, and was ſo ſtruck with their beauty, that he laid a fine and puniſhment on all who ſhould kill or diſturb them; the Greeks were ſo much taken with the beauty of this bird, when firſt brought among them, that it was ſhown for money, and many came to Athens from Lacedæmon and Theſſaly to ſee it; once eſteemed a delicacy at the tables of the rich and great; Aufidius Hurco ſtands charged by Pliny with being the firſt who fatted up peacocks for the feaſts of the luxurious; Hortenſius the orator was the firſt who ſerved them up at an entertainment at Rome; and they are talked of as the firſt of viands; in the times of Francis I. it was a cuſtom to ſerve up peacocks to the tables of the great, not to be eaten, but ſeen; in what manner they ſerved them; its fleſh is ſaid to keep longer unputrefied than any other; has a predelection for barley; but as a proud and fickle bird there is ſcarce any food it will at all times like; it ſtrips the tops of houſes of tiles or thatch, lays waſte the labours of the gardener, roots up the choiceſt ſeeds, and nips favourite flowers in the bud; is ſtill more ſalacious than the cock; requires five females at leaſt to attend him; and the number not ſufficient, will run upon and tread the ſitting hen; the peahen, as much as poſſible hides her neſt from him, that he may not diſturb her ſitting; ſhe ſeldom lays above five or ſix eggs in this climate; Ariſtotle deſcribes her laying twelve; in foreſts where they breed naturally, they are very numerous; this bird lives about twenty years, and not till the third year has that beautiful variegated plumage of its tail; in the kingdom of Cambaya, ſays Taverner, near the city of Baroch, whole flocks of them are in the fields; deſcription of their habits; decoy made uſe of to catch them there, iii. 124 to 127.

Peacock, (ſea) a name given the Balearic crane, iii. 235.

Peak of Teneriff, its volcano ſeldom free from eruptions, i. 62.

Peak, mountain in the Molucca iſlands, ſwallowed by an earthquake, i. 97.

Pearl, an animal ſubſtance concreted and taking a tincture from the air;

found in all bivalved ſhells, the inſide of which reſemble that ſubſtance called mother-of-pearl; *pearl-oyſter*, from which the mother-of-pearl is taken; ſeveral pearl fiſheries; the chief of them in the Perſian Gulph, and the moſt valuable pearls brought from thence; wretched people deſtined to fiſh for pearls; uſually die conſumptive; in what manner they fiſh for them, iv. 61 to 64.

Pearls in ſtags, are parts riſing from the cruſt of the beam, ii. 98.

Peccary, or *tajacu*, an animal, a native of America, at firſt view reſembling a ſmall hog; its deſcription; has upon the back a lump like the navel in other animals; goes in herds of two or three hundred, and unites, like hogs, in each other's defence; delights not in marſhes or mud like our hogs; an unceaſing enemy to the lizard, the toad, and the ſerpent kinds; alſo feeds upon toads and ſerpents, ii. 137 to 139.

Pedigree, the Arabians preſerve that of their beſt horſes, ii. 10.

Pegu, a river called the Indian Nile, becauſe of its overflowing, i. 128.

Pelagii, the Latin name for thoſe ſhells fiſhed up from the deep, iv. 40.

Pelecan, a ruminating bird, ii. 39; a native of Africa and America; its deſcription; the deſcription of the bird from Father Labat; their fleſh rancid, and taſtes worſe than it ſmells; uſe made by the Americans of their pouches; is not entirely incapable of inſtruction in a domeſtic ſtate; inſtances of it; Aldrovandus mentions one believed to be fifty years old, iii. 267 to 272.

Penguin, a heavy water-fowl; the wings of this tribe unfit for flight; and their legs ſtill more awkwardly adapted for walking; they dive to the bottom, or ſwim between two waters; they never viſit land but when coming to breed; their colour; are covered more warmly with feathers than other birds; deſcription of the Magellanic penguin; they unite in them the qualities of men, fowls, and fiſhes; inſtances of its gluttonous appetite; their food and fleſh; are a bird of ſociety, iii. 287 to 290.

Peninſula of India, on one ſide the coaſts are near half the year haraſſed by violent hurricanes and northern tempeſts, i. 200.

Penpark-hole, in Glouceſterſhire; its deſcription, from Captain Sturmey, i. 44.

People, ſo young as fourteen or fifteen often found to ceaſe growing, i. 273.

Pepper, the Indians prefer that devoured and voided unconcocted by the toucan, iii. 161.

Perch, a prickly-finned thoracic fiſh, its deſcription, iii. 400.

Perfumes, no perfume has a ſtronger or more permanent ſmell than muſk, ii. 85; the ſcent of the martin a moſt pleaſing perfume, 236; ſome of the weaſel kind have a ſmell approaching to perfume, 243; that of the muſk or the civet, 244; in what manner taken from the pouch; more grateful perfume than muſk; is communicated to all parts of the animal's body; the fur impregnated, and the ſkin alſo; a perſon ſhut up with one of the ſkins in a cloſe room cannot ſupport the ſcent; this purfume ſold in Holland for about fifteen ſhillings an ounce, 246 to 248.

Perſepolis, its paſtures excellent for the purpoſes of rearing horſes, ii. 16.

Perſia, the horſes of that country the moſt beautiful and moſt valuable of all in the Eaſt, ii. 16; there are ſtuds of ten thouſand white mares together, with the hoof ſo hard that ſhoeing is unneceſſary, 13; deſcription of the Perſian horſes by Pietro della Valle, 16; the fleſh of the wild aſs ſo much liked that its delicacy is a proverb there; an entertainment of wild aſſes exhibited by the monarch to Olearius, 25; two kinds of aſſes there, and ſome of them worth forty or fifty pounds, 29.

Perſian Gulph, a very dangerous wind prevails, by the natives called the Sameyel; it ſuddenly kills thoſe it involves in its paſſage, and frequently aſſumes a viſible form, darting in a blueiſh vapour along the ſurface of the country, i. 206.

Perſpiration, an experiment from which the learned may infer upon what foundation the doctrine of Sanctorian perſpiration is built, i. 290.

Peruvians, underſtood the art of preſerving their dead for a long time, i. 378.

Peter the Great, of Ruſſia, celebrated a marriage of dwarfs; the preparations for this wedding were grand, yet in a ſtyle of barbarous ridicule, i. 367.

Petroleum, an injection of this bituminous oil inwardly, and an application of aſphaltum without, ſuffice to make a mummy, i. 386.

Pettichaps, a bird of the ſparrow-kind, iii. 196.

Phalanger, a kind of oppoſſum; its deſcription; called the rat of Surinam, ii. 387.

Pharaoh, (the cat of) name given to ichneumon, ii. 240.

Pharaoh, (the capon of) thought to be the true ibis; a devourer of ſerpents, iii. 233.

Phaſis, a river of Colchis, in Aſia Minor, from the banks of which the pheaſants were brought into Europe, and ſtill retain their name, iii. 131.

Phatagin, an animal leſs than the pangolin; where to be found, ii. 320.

Pheaſants, at firſt propagated among us, brought into Europe from the banks of the Phaſis, a river of Colchis, in Aſia Minor, whence they ſtill retain their name; deſcription of this beautiful bird; wild among us, is an envied ornament of our parks and foreſts, where he feeds upon acorns and berries; in the woods the hen pheaſant lays from eighteen to twenty eggs in a ſeaſon; but in a domeſtic ſtate ſeldom above ten; it is better left at large in the woods than reduced to its priſtine captivity; its fecundity, when wild, is ſufficient to ſtock the foreſt, and its fleſh acquires a higher flavour from its unlimited freedom; many varieties of pheaſants; of all others, the *golden pheaſant* of China the moſt beautiful, iii. 131 to 134.

Phlegium, a high mountain of Ethiopia, ſwallowed by an earthquake, i. 97.

Pholas, the file-fiſh, places where theſe animals are found; their power of penetrating; the pillars of the temple of Serapis at Puteoli were penetrated by them; they pierce the hardeſt bodies with their tongue, iv. 67, 68.

Pichincha, a remarkable mountain, near Quito, in South America, i. 91.

Pie, no claſs of birds ſo ingenious, active, and well-fitted for ſociety; they live in pairs, and their attachments are confined to each other; they build neſts in trees or buſhes; the male ſhares in the labour of building, and relieves his mate in the duties of incubation; and the young once excluded, both are equally active in making them ample proviſion; general laws prevail, and a republican form of government is eſtabliſhed among them; they watch for the general ſafety of every bird of the grove; they are remarkable for inſtinct and capacity for inſtruction; inſtances of it; the few general characters in which they all agree, iii. 147 to 149.

Pie, (ſea) breeds in this country, and reſides in its marſhy parts, iii. 256.

Pigeons, are ruminating birds, ii. 39; thoſe that live in a wild ſtate by no means ſo fruitful as thoſe in our pigeon-houſes nearer home; the tame pigeons, and all its beautiful varieties, owe their origin to one ſpecies, the ſtock-dove; various names of tame pigeons; attempts made to render domeſtic the ring-dove, but hitherto fruitleſs; the turtle-dove a bird of paſſage; a pair put in a cage, and one dying, the other does not ſurvive; the pigeon called ocotzimtzcan, is one of the ſplendid tenants of the Mexican foreſts; pigeons of the dove-houſe not ſo faithful as the turtle-dove; near fifteen thouſand pigeons may in four years be produced from a ſingle pair; the ſtock-dove ſeldom breeds above twice a year; have a ſtronger attachment to their young than thoſe who breed ſo often; the pigeons called carriers uſed to convey letters, not trained with as much care as formerly, when ſent from a beſieged city to thoſe coming to relieve it; in an hour and a half, they perform a journey of forty miles, iii. 182 to 187.

Pigmy, exiſtence of a pigmy race of mankind founded in error or in fable, i. 366.

Pigtail, is the laſt of the baboons; its deſcription, ii. 369.

Pike, the deſcription of this fiſh, iii. 403; inſtances of its rapacity, 420.

Pilchards, little differing from the herring; make the coaſt of Cornwall their place of reſort; advantages of this fiſhery; money paid for pilchards exported has annually amounted to near fifty thouſand pounds, iii. 413, 414.

Pillau, on the Baltic, the ſhores there divided into diſtricts for the ſturgeon-fiſhery, iii. 386.

Pills, of calcined ſhells and tobacco, uſed by the American Indians to palliate hunger, i. 302.

Pilori, one of the three diſtinctions of the muſk rat; a native of the Weſt Indies, ii. 296.

Pilot of the ſhark, name given the ſucking-fiſh or remora, and why, iii. 368.

Pinch, name of a monkey of the ſagoin-kind; its deſcription, ii. 381.

Pintada, or the guinea hen, its deſcription; different names given to this bird, iii. 135.

Pintail, a kind of duck, iii. 308.

Pipal, the Surinam toad, an extraordinary and hideous creature; its deſcription, iv. 89, 90.

Pipe-fiſh, cartilaginous, and not thicker than a ſwan quill; its deſcription, iii. 391.

Piper-worms, and other little animals, fix their habitations to the oyſter's ſides, and live in ſecurity, iv. 58.

Pit falls, a wolf, a friar, and a woman taken in one all in the ſame night, ii. 210.

Pithekos, a name given by the ancients to the ape properly ſo called, ii. 364.

Pivot, the razor-ſhell, its motion, and habits; is allured by ſalt, iv. 60, 61.

Placenta, that body by which the animal is ſupplied with nouriſhment, i. 252.

Plague, not well known whence it has its beginning; is propagated by infection; ſome countries, even in the midſt of Africa, never infected with it; others generally viſited by it once a year, as Egypt; not known in Nigritia; Numidia it moleſts not once in a hundred years; plague ſpread over the world in 1346, after two years travelling from the great kingdom of Cathay, north of China, to Europe; the plague deſolated the city of London in 1665; for this laſt age, it has abated its violence, even in thoſe countries where moſt common and why; a plague affected trees and ſtones, i. 189 to 191.

Plaiſne en Anjou, a village in France, particular account of a dwarf born there, i. 368.

Plaiſter of Paris finely powdered boils and heaves in great waves, like water, i. 107.

Planets exceed the earth one thouſand times in magnitude; at firſt ſuppoſed to wander in the heavens without fixed paths; perform their circuits with great exactneſs and ſtrict regularity, i. 10.

Plants and vegetables, will not grow ſo faſt in diſtilled as undiſtilled water, i. 100; ſmell of ſome ſo powerful as hardly to be endured 129; do not vegetate in an exhauſted receiver, 182; but thus ceaſing to vegetate, keep longer ſweet than when expoſed to external air, 183; their juices rarefied principally by the ſun, to give an eſcape to their impriſoned air, 195; a certain plant in Ireland ſo ſtrongly affected the perſon who beat it in a mortar, and the phyſician preſent, that their hands and faces ſwelled to an enormous ſize, and continued tumid for ſome time after, 189; compared with animals, ſimilitude; how aſſimilated in different climates and ſoils, 232 to 235; the ſenſitive, that moves at the touch, has as much perception as the freſh-water polypus, poſſeſſed of a ſtill ſlower ſhare of motion, 232. See *Caraguata*, i. 233. See *Paraſite*, 236.

Plate, or *Plata*, a great river in South America; its ſource and length, i. 127.

Platina, or white gold, the moſt obſtinate of all ſubſtances, i. 48.

Plemonecles, the flumide, deſcription of this fiſh, iii. 402, 403.

Pleurs en Champagne, a town in France, buried beneath a rocky mountain, i. 94.

Pliny, in his arrangements, placed the bats among birds, ii. 326.

Plover, the green and grey, are birds of paſſage; the Norfolk plover, iii. 256.

Plumage of the king-fiſher preſerves its luſtre longer than any other, iii. 317.

Pochard, a kind of duck, iii. 308.

Poetry, our anceſtors excel us in the poetic arts, i. 375.

Pointer, a kind of dog, ii. 192.

Poiſon, the moſt deadly poiſons are often of great uſe in medicines, i. 237;

fiſhes often live and ſubſiſt upon ſuch ſubſtances as are poiſonous to the more perfect claſſes of Animated Nature; the many ſpeculations and conjectures to which this poiſonous quality in ſome fiſhes has given riſe, iii. 422, 423; ſome crabs found poiſonous, iv. 16; the ſeat where the poiſon in venomous ſerpents lies, 136; the ſerpent-poiſon may be taken inwardly, without any ſenſible effects, or any prejudice to the conſtitution; if milk be injected into a vein, it will kill with more certain deſtruction than even the poiſon of the viper, 138, 139. See *Fir-flare.* See *New Providence.*

Polar, regions, deſcription of them, i. 14; and of the inhabitants round them, 346.

Pole-cat, a diſtinct ſpecies from the ermine; reſembles the ferret ſo much, that ſome have thought them the ſame animal; there are many diſtinctions between them; deſcription of the pole-cat; very deſtructive to young game; the rabbit its favourite prey; and one pole-cat deſtroys a whole warren by a wound hardly perceptible; generally reſide in woods or thick brakes, making holes two yards deep under ground; female brings forth in ſummer five or ſix young at a time, and ſupplies the want of milk with the blood of ſuch animals as ſhe can ſeize; the fur is in leſs eſtimation than of inferior kinds, and why; an inhabitant of temperate climates, being afraid of cold as well as heat; the ſpecies confined in Europe to a range from Poland to Italy, iii. 231 to 235; pole-cat of America and Virginia are names for the ſquaſh and the ſkink; diſtinctions of theſe animals, 241; ſeizes the flying ſquirrel, 273.

Poles, trade-winds continually blow from them towards the equator, i. 198; the winter beginning round the poles, the ſame miſty appearance produced in the ſouthern climates by heat is there produced by cold; the ſea ſmokes like an oven there, 222; the ſtrength of the natives round the polar regions is not leſs amazing than their patience in hunger, 348.

Polynemus, deſcription of this fiſh, iii. 401.

Polypus very voracious; its deſcription; uſes its arms as a fiſherman his net; is not of the vegetable tribe, but a real animal; every polypus has a colony ſprouting from its body; and theſe new ones, even while attached to the parent, becomes parents themſelves, with a ſmaller colony alſo budding from them; though cut into thouſands of parts, each ſtill retains its vivacious quality, and ſhortly becomes a diſtinct and complete polypus, fit to reproduce upon cutting in pieces; it hunts for its food, and poſſeſſes a power of chooſing it or retreating from danger, i. 243, 244; dimenſions of the ſea-polypus; and of that which grows in freſh waters; the power of diſſection firſt tried upon theſe animals to multiply their numbers; Mr. Trembley has the honour of the firſt diſcovery of the amazing properties and powers of this little vivacious creature; their way of living; arms ſerve them as lime-twigs do a fowler; how it ſeizes upon its prey; the cold approaching to congelation, they feel the general torpor of Nature, and their faculties are for two or three months ſuſpended; ſuch as are beſt ſupplied ſooneſt acquire their largeſt ſize, but they diminiſh alſo in their growth with the ſame facility, if their food be leſſened; ſome propagated from eggs; ſome produced by buds iſſuing from the body, as plants by inoculation; while all may be multiplied by cuttings to an amazing degree of minuteneſs; of thoſe produced like buds from the parent ſtem, ſhould the parent ſwallow a red worm, it gives a tincture to all its fluids, and the young partakes of the parental colour; but if the latter ſhould ſeize upon the ſame prey, the parent is no way benefited by the capture, all the advantage thus remains with the young; ſeveral young of different ſizes are growing from its body; ſome juſt budding forth, others acquiring perfect form, and others ready to drop from the original ſtem; thoſe young, ſtill attached to the parent, bud and propagate alſo, each holding dependence upon its parent; artificial method of propagating theſe animals by cuttings; Mr. Huges deſcribes a ſpecies of this animal, but miſtakes its nature, and calls it a ſenſitive flowering plant, iv. 317 to 323.

Polypus-coral, the work of an infinite number of reptiles of that kind, iv. 324.

Pomerania, a large part of it covered by the ſea, i. 162.

Pongo, name given by Battel to the ouran-outang, ii. 361.

Poppies affect with drowſineſs thoſe who walk through fields of them, i. 189.

Porcelain, an artificial compoſition of earth and water, united by heat, i. 99.

Porcupine, as to quills, might be claſſed among the birds, i. 400; its deſcription, ii. 312; of all theſe brought into Europe, not one ever ſeen to launch its quills, though ſufficiently provoked; their manner of defence; directs its quills pointing to the enemy; and Kolben relates, the lion then will not venture an attack; feeds on ſerpents and other reptiles; porcupine of Canada ſubſiſts on vegetables; thoſe brought to this country for ſhow uſually fed on bread, milk, and fruits; do not refuſe meat when offered; is extremely hurtful to gardens; the Americans, who hunt it, believe it lives from twelve to fifteen years; time of their geſtation; the female brings forth one at a time; ſhe ſuckles it about a month, and accuſtoms it to live like herſelf upon vegetables and the bark of trees; the porcupine never attempts to bite or any way injure its purſuers; manner of eſcaping, when hunted by a dog or a wolf; circumſtances concerning it remain to be known; little known with preciſion, except what offers in a ſtate of captivity; deſcription of one kept in an iron cage; the porcupine of America differs much from that of the ancient continent; two kinds, the couando and the urſon; deſcription of both, 313 to 315.

Porcupine of the ſea, deſcribed, iii. 392.

Pork, unpalatable with us in ſummer, is the fineſt eating in warmer latitudes, ii. 25.

Porpuſs, or *porpeſſe*, a fiſh leſs than a grampus, with the ſnout of a hog; its deſcription and habits, i. 355; poſſeſs, proportionably to their bulk, the manners of whales; places where they ſeek for prey; manner of killing them in the Thames; yield a large quantity of oil; the lean, of ſome not old, ſaid to be as well taſted as veal; caviar prepared from the eggs of this fiſh, 358, 359.

Ports choaked up with ſand by the vehemence of the wind, i. 201.

Pouch, or bag, receptacle of the civet, ii. 246. See *Buſtard*, iii. 137. See *Pelican*, iii. 268.

Poultry, general characteriſtics of the poultry kind; nearly all domeſtic birds of this kind maintained in our yards, are of foreign extraction; the courtſhip of this kind is ſhort, and the congreſs fortuitous; the male takes no heed of his offspring; though timorous with birds of prey, he is incredibly bold among his own kind; the ſight of a male of his own ſpecies produces a combat; the female takes all the labour of hatching and bringing up her young, chooſing a place remote from the cock, iii. 115 to 117.

Powis Land, in Wales, for many ages famous for a ſwift and generous race of horſes, ii. 21.

Powters, a variety of the tame pigeons, iii. 186.

Pregnancy of ſome women found to continue a month beyond the uſual time, i. 256; of all animals, in point of time, is proportioned to their ſize, 413; in that ſtate no animals, except the hare, receive the male, ii. 256; the duration in the female of the elephant ſtill unknown, 398.

Preſſures, perpendicular in rivers, always in exact proportion to the depth, i. 118.

Prey, all the males of theſe birds leſs and weaker than the females, iii. 79. See *Birds*.

Pricket, name hunters give the buck the ſecond year, ii. 106.

Propagation of gnats, one of the ſtrangeſt diſcoveries in natural hiſtory, iv. 305; a new kind lately diſcovered in a moſt numerous tribe of animals, propagated by cuttings, 308; different manner of that operation in the polypi, 321.

Propolis, a reſinous gum, with which bees plaiſter the inſide of their hives, iv. 261.

Proportion of the human figure, little known with preciſion in regard to it, i. 288.

Provider of the lion, what has given way to the jackal's being ſo called, i. 405.

Pſalmodi, an iſland in France, in A. D. 815, now ſix miles from the ſhore, i. 161.

Ptarmigan, ſort of grouſe, chiefly found in heathy mountains, and piny foreſts, iii. 138.

Pthiriaſis, the louſy diſeaſe, frequent among the ancients; principal people who died of this diſorder; plants and animals are infeſted with diſeaſes of this kind; a vegetable louſe from America over-run all the phyſic-garden of Leyden; the leaf-louſe deſcribed; three principal and conſtant enemies to theſe inſects, iv. 177 to 180.

Puffin, or coulterneb, marks that diſtinguiſh this bird; its reſidence; migrations; found by hundreds, caſt away upon ſhores, lean and periſhed with famine; lays one egg; few birds or beaſts venture to attack its retreat; in what manner it defends itſelf againſt the raven; the Manks puffin is itſelf one of the moſt terrible invaders; inſtances of it; places which abound with them; in what manner their young are fed; their food. iii. 292 to 295.

Puget, adapted the cornea of a flea in ſuch a poſition, as to ſee objects thro' it by the means of a microſcope; ſtrangeneſs of the repreſentations, iv. 244.

Puma, an animal decorated with the name of American lion, though, when compared ſo contemptible as to be inferior to that called the American tiger, ii. 163.

Pump, an experiment upon a carp put under a receiver, iii. 329.

Purre, a ſmall bird of the crane kind, with a ſhorter bill, and thighs bare of feathers, iii. 253.

Puteoli, a city ſwallowed up by an earthquake, had a temple of Serapis, the pillars of which, while under water, were penetrated by the pholas, or file-fiſh, iv. 68.

Putrefaction, a new cauſe of animal life, i. 242.

Pyramids of Egypt, one of them entirely built of a kind of free-ſtone, in which petrified ſhells are found in great abundance, i. 34.

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Runts, a variety of tame pigeons produced by croſs coupling, iii. 166.

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Scallop, in its ſhell, moves forward upon land, and ſwims upon the ſurface of the water, by contrivance in a ſingular manner, iv. 60.

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Scoup-duck, a variety of the duck kind, iii. 308.

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Scbotteus aſſures us, he ſaw an inſtance of fiſhes being allured by muſic, i. 322.

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Scomver, the mackarel, a prickly-finned thoracic fiſh; its deſcription, iii. 400.

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Scorpion, four principal parts diſtinguiſhable in this animal; the reſervoir where its poiſon is kept; effect of its ſting upon a dog, in an experiment made by M. Maupertuis; experiments made upon other dogs; inſtances of its iraſcible nature and malignity; when driven to extremity, deſtroys itſelf; inſtance of it; captivity makes it deſtroy its young; a ſcorpion of America produced from the egg, iv. 186 to 191.

Scorpion (Water) an inſect with wings, deſcribed, iv. 221.

Scoter, an European duck, iii. 308.

Scotland, has land in it at one time covered with water, at another free, i. 162.

Scotchman, in the Tower, took not the leaſt ſuſtenance during ſix weeks, i. 302.

Sea, was open to all till the time of the emperor Juſtinian, i. 156; ſenſibly retired in many parts of the coaſts of France, England, Holland, Germany, and Pruſſia, 160; Norwegian ſea has formed ſeveral little iſlands from the main land, and ſtill daily advances upon the continent, 162; its colour not from any thing floating in it, but from the different reflections of the rays of light; a proof of it; the ſea grows colder in proportion as divers deſcend, 169; ſmokes like an oven near the poles, when the winter begins, 222; no fiſh imbibe any of the ſea-ſaltneſs with food or in reſpiration, iii. 407.

Sea (Red) choaked up with coralline ſubſtances, i. 167.

Sea-eggs, name given to the multivalve ſhell-fiſh, of the echini, which move, iv. 65.

Sea-nettles, name given by ſome to the ſtar-fiſh, iv. 314.

Sea-water, various methods propoſed to render it freſh for the uſe of ſeamen in long voyages, i. 139; about a forty-fifth part heavier than freſh-water; is heavier, and conſequently ſalter, the nearer we approach the line, 141.

Sea-worm may be multiplied by being cut to pieces, i. 242. See *Polypus*.

Seal, its deſcription; the varieties innumerable; the brain largeſt of any animal; the *foramen ovale* in its heart never cloſing, fits it for continuing under water; the water its habitation; ſeldom at a diſtance from the ſhore; found in the North and Icy Seas, and on thoſe ſhores in flocks; gregarious and migrant; direct their courſe to northern coaſts, and ſeas free of ice, in two departures, obſerving time and track; how and by what paſſages they return unknown; females in our climate bring forth in winter; where they rear their young; hunt and herd together, and have a variety of tones like dogs and cats, to purſue prey, or warn of danger; neither length of time in pregnancy, nor duration of theſe animals' lives yet known; two taken young, after ten years had the marks of age; how the Europeans and Greenlanders deſtroy them; in our climate they are wary, and ſuffer no approach; never ſleep without moving, and ſeldom more than a minute; taken for the ſkin and oil the fat yields; the fleſh formerly at the tables of the great; an inſtance of it; ſea-lion, in Anſon's Voyages, the largeſt of the ſeal family, ii. 343 to 350.

Seeds, ſome thought to thrive better for maceration in the ſtomach of birds, before they be voided on the ground, iii. 197.

Senegal, a river in Africa, its courſe; is navigable for more than three hundred leagues, i. 125; receives more than twenty rivers, 128; the natives conſider forty years as a very advanced time of life, and generally die of old age at fifty, 186.

Senſations, their illuſions at firſt when man is newly brought into exiſtence, deſcribed by Mr. Buffon, i. 332; fiſh fall behind terreſtrial animals in their ſenſations, iii. 322.

Senſes, of all ſenſes man is moſt inferior to other animals in that of ſmelling; and it ſeems not to offend them, i. 328; the groſſeſt, and moſt uſeful of all, is that of feeling, 331.

Senſitive plant, has as much perception as the freſh-water polypus, i. 232.

Seps, improper name of the Chalcidian lizard; its deſcription, iv. 116.

Seraglio, to be able to furniſh one the only ambition of an Aſiatic, i. 269.

Serpents, the ſea about the iſlands of Azores repleniſhed with them for want of motion, i. 140; the various hiſſings at the cloſe of the evening, make a louder ſymphony in Africa, than birds in European groves in a morning, 405; to believe all ſaid of the ſea-ſerpent is credulity, to refuſe aſſent to its exiſtence is preſumption, iii. 340; ſea-ſerpent, the elops deſcribed, 401; marks diſtinguiſhing them from the reſt of animals; their conformation; progreſſive motion; the only animal in the foreſt that oppoſes the monkey; entwines and devours the buffalo; no animals bear abſtinence ſo long as they; little ſerpents live for ſeveral years in glaſſes, never eat at all, or ſtain the glaſs with excrements; little ſerpent at the Cape of Good Hope, and north of the river Senegal; long ſerpent of Congo; ſome bring their young alive, ſome bring forth eggs; ſome venomous, and ſome inoffenſive; animals which deſtroy them; boaſted pretenſions of charming ſerpents; have docility; Egyptians paid adoration to a ſerpent, and the inhabitants of the weſtern coaſt of Africa retain the ſame veneration; all amphibious; their motion, ſwimming in liquids; the Æſculapian ſerpent, iv. 120 to 130; ſeat of poiſon in venomous ſerpents; inſtrument by which the wound is made; thoſe deſtitute of fangs are harmleſs; various appearances the venom produces; may be taken inwardly without ſenſible effects or prejudice to the conſtitution; inſtance of the force of ſerpents' poiſon from Ray; their principal food birds, moles, toads, lizards, 136 to 140; the prince of ſerpents, a native of Japan, the greateſt favourite of ſavages, 152.

Serval, a native of Malabar, reſembling the panther in its ſpots, ii. 177.

Setter, a dog of the generous kind, ii. 192.

Severn, lamprey of this river, the moſt delicate of all fiſh, iii. 380.

Shagreen, made of the ſkin of the wild aſs, ii. 24; alſo of the ſhark, iii. 369.

Shammoy, a kind of goat, in the mountains of Dauphiny, Piedmont, Savoy, Switzerland, and Germany; its deſcription; their fleſh good to eat; in caſes of danger, its hiſſing noiſe is heard at a great diſtance; by ſmell diſcovers a man at half a league; admired for the beauty of its eyes; not found in ſummer except in caverns of rocks, amidſt fragments of ice, or under ſhades of ſpreading trees; during winter, it ſleeps in the thicker foreſts, and feeds upon ſhrubs and buds of pine-trees, and ſcratches up the ſnow for herbage; manner of hunting it; ſkin of the ſhammoy when tanned, liked for ſoftneſs and warmth; the leather now called ſhammoy, made from the tame goat, ſheep, and deer, ii. 71 to 74. See *Bezoar*, ii. 74.

Shank, the *red* and *green ſhank*, varieties of the crane kind, iii. 253.

Shark, deſcription of the great white ſhark; no fiſh ſwims ſo faſt; outſtrips the ſwifteſt ſhips; inſtances of frightful rapacity in this fiſh; its enmity to man; uſual method of ſailors to take them; no animal harder to kill; how killed by the African Negroes; the remora, or ſucking-fiſh ſticks to it; for what purpoſe; brings forth living young; Rondeletius ſays, the female of the blue ſhark lets her brood, when in danger, ſwim down her throat, and ſhelter in her belly, iii. 364 to 368.

Sheat-fiſh, the ſilurus of the prickly-finned abdominal kind, iii. 401.

Sheep, the author ſaw one that would eat fleſh, i. 408; proper care taken of the animal produces ſavourable alterations in the fleeces here and in Syria, 409; in courſe of time impoveriſh the paſturage, ii. 42; in the domeſtic ſtate, ſtupid, moſt defenceleſs, and inoffenſive; thoſe without horns, more dull and heavy than the reſt; thoſe with longeſt and fineſt fleeces moſt ſubject to diſorders; the goat, reſembling them in many reſpects, much their ſuperior; they propagate together, as of one family; diſtinguiſhed from deer, 55, 56; do not appear from old writers to have been bred in early times in Britain; no country produces ſuch ſheep as England, larger fleeces, or better for cloathing; ſheep without horns the beſt ſort; the ſheep in its nobleſt ſtate is in the African deſert, or the extenſive plains of Siberia; ſheep in the ſavage ſtate; the woolly ſheep is only in Europe, and in the temperate provinces of Aſia; ſubſiſts in cold countries, but not a natural inhabitant of them; the Iceland ſheep have four, and ſometimes eight horns; with broad tails, common in Tartary, Arabia, Perſia, Barbary, Syria, and Egypt; the tail often weighs from twenty to thirty pounds; thoſe called ſtrepſicheros, a native of the Archipelago; Guinea ſheep deſcribed; bring forth one or two at a time, ſometimes three or four; bear their young five months, 58 to 63; the inteſtines thirty times the length of their body, 151; in Syria and Perſia, remarkable for fine gloſs, length, and ſoftneſs of hair, 153. See *Moufflon*.

Sheldrake, a variety of the pond-duck, ſuppoſed a native of England, iii. 308.

Shells, (foſſil) found in all places near to and diſtant from the ſea, upon the ſurface of the earth, on the tops of mountains, or at different depths digging for marble, chalk, or other terreſtrial matters, ſo compact as to preſerve theſe ſhells from decay, i. 18; various kinds found at a hundred miles from the ſea, at Touraine in France; a continued bed of oyſter-ſhells found through the whole circumference of five or ſix acres of ground near Reading, in Berkſhire; ſhells found petrified in all the Alpine rocks, in the Pyrenees, on the hills of France, England, and Flanders; a floor, or pavement of petrified ſhells found in Kent, near the Medway; ſhells always remaining in the deep; eaſier to believe foſſil ſhells bred in freſh-water, than that the ſea for a time covered the tops of high mountains, i. 30 to 35; methods of conveying a juſt idea of the formation of ſea-ſhells and garden-ſhells; uſual way of accounting for different colouring in ſhells; they aſſume every colour but blue; *ſtairs-ſhell*, or *admiral ſhell*, not more precious for their ſcarceneſs, than pearls for their beauty; collections of ſhells have their uſe; naturally claſſed by Ariſtotle; places where ſhells are found, and ſubſtances of which they are compoſed; ſuppoſition that all earths fermenting with vinegar, are compoſed of ſhells crumbled down to one maſs; what ſhells moſt valuable; ſea-ſhells exceed land or foſſil-ſhells in beauty; ſome living land-ſhells not inferior in beauty to freſh-water ſhells; great variety of foſſil, or extraneous ſhells; different ſtates of preſervation; every ſhell the ſpoil of ſome animal; no matter how parted from the ſea, iv. 34 to 41.

Shells of the ſea, of all ſea-ſhells, that of the nautilus the thinneſt and moſt eaſily pierced, iv. 52; all bivalved ſhells furniſh pearls, and their inſides reſemble and afford that ſubſtance called mother-of-pearl, 61.

Shells (animal) of the armadilla or tatou, one of the moſt ſtriking curioſities in natural hiſtory, ii. 321; turtle ſhells of an amazing magnitude, iv. 29.

Shetland Iſles, amazing quantities of herrings appearing off theſe iſlands, iii. 411.

Shores. See *St. Kilda*.

Short-heads, name given by ſailors to the young of the whale, iii. 344.

Shoveller, ſpecies of the crane kind; inhabitants of the Cape of Good Hope reſpect it as the ancient Egyptians did their ibis; its neſt and eggs, iii. 245.

Shoulders, high in ſickly perſons; people dying are ſeen with their ſhoulders drawn up; ſhoulders in women narrower than in men, i. 286, 289.

Showers, ſhower of hail in 1510; its deſcription, i. 216; of ſtones, fiſhes, and ivy-berries, raiſed into the air by tempeſts, in one country, and falling at a diſtance like rain to aſtoniſh another, 224.

Siaguſh. See *Lynx*.

Siberia, the iſatis found in this country, and ſeldom in milder climates, ii.

221; the ſable reſembling the martin found in it, 240; enormous tuſks found lodged in the ſandy banks of its rivers, 405.

Sighs, in what manner produced; when invigorated produce ſobbing, i. 280.

Sight, of old men indiſtinct for bodies cloſe to them, but more preciſe for objects at a diſtance from them, and why, i. 316; of birds exceeds that of other animals, and excels in ſtrength and preciſion; a kite, from an imperceptible height in the clouds ſees its prey, and darts on it with unerring aim, iii. 40; of birds that prey by day, aſtoniſhingly quick, and in ſuch as ravage by night, ſo fitted as to diſcern objects in darkneſs with preciſion, 78.

Signs of death, uncertainty of them ought to make every one cautious of giving up a friend as dead, and expoſing him to real death, or a premature interment, i. 344.

Silks, brought to Jamaica, and there expoſed to the air, rot while they preſerve their colour, but kept from air, retain their ſtrength and gloſs, i. 181.

Silk Manufactures, eſtabliſhed in Europe, in the beginning of the twelfth century, by Roger of Sicily, iv. 251.

Silkworm, the moſt ſerviceable of all ſuch creatures, iv. 226; its real hiſtory unknown among the Romans to the time of Juſtinian, and ſuppoſed only brought into Europe in the twelfth century; two methods of breeding them; Pauſanias's deſcription of this worm; changes its ſkin in three weeks or a month; gummy fluid forming the threads; preparations made before ſpinning the web; the cone or ball of ſilk deſcribed; efforts to burſt the cone; free from confinement, it neither flies nor eats; few of theſe animals ſuffered to come to a ſtate of maturity, and why, 251 to 256.

Silurus, the ſheat-fiſh of the prickly-finned abdominal kind, iii. 401.

Simeon, ſaid to have lived a hundred and twelve years, i. 302.

Sinews of the rein-deer, the ſtrongeſt kind of ſewing-thread, ii. 127.

Single name of the tail of the ſtag, ii. 98.

Siſkin, ſinging-bird of the ſparrow kind, with a thick and ſhort bill, iii. 197.

Size of men varies conſiderably; the human body often differs from itſelf; the ſame perſon taller in the morning than at night; ſometimes the difference is an inch; this firſt perceived in England by a recruiting officer; men are tall from five feet eight inches to ſix feet high; middle ſize from five feet five to five feet eight, i. 289, 290; Maximin, the emperor, above nine feet in height, 294; approaching towards the north pole, the natives diminiſh proportionably, growing leſs and leſs in higher latitudes, 348.

Skeleton of the bat, in ſome meaſure, reſembles that of man, ii. 326; ſome human lately diſcovered of an enormous ſize, on the banks of the Ohio, in America, 405.

Skin, the only part of the body that age does not harden; whence its wrinkles proceed, i. 338; of the rein-deer, ii. 127; of the tiger, 169; of the black fox, 217; moſt valuable part of the martin's ſkin; of all, that of the ſable moſt coveted, and held in higheſt price, the fur ſurpaſſing all, 238, 239; of the civet, 247; of the ondatra alſo very valuable, 299; of the mole, 307; of the hedgehog, 310; of the elephant, 396; of the rhinoceros, 406; of the oſtrich, iii. 68; of the great Greenland whale, 341.

Skink, an animal called one of the pole-cats of America, ii. 243.

Skull-fiſh, name of the whale above two years old, iii. 344.

Slatberg, in Ireland, (in the lands of) there ſtood a declivity, and the earth of it was found ſliding down the hill upon the ſubjacent plain, i. 95.

Sleep, with ſome of the lower animals takes up the greateſt part of their lives; man the only creature requiring ſleep from double motives, for the refreſhment of the mental and of the bodily frame; want of it produces madneſs; procured to man with more difficulty than to other animals; in what manner ſleep fetters us for hours together, according to Rohault; bodily labour demands a leſs quantity of it than mental; the famous Philip Barretier ſlept twelve hours in the twenty-four; numberleſs inſtances of perſons, who, aſleep, performed many ordinary duties of their calling; and, with ridiculous induſtry, completed by night, what they failed doing by day; remarkable inſtance related in the German Ephemerides. See *Arlotto*, i. 303 to 307.

Sloth, two different kinds of that animal, the air and the unan; both ſeem the meaneſt and moſt ill-formed of all animals that chew the cud; formed by nature to climb; they get up a tree with pain, but utterly unable to deſcend; drop from the branches to the ground; ſtrip a tree of its verdure in leſs than a fortnight, afterwards devour the bark, and in a ſhort time kill what might prove their ſupport; every ſtep taken, ſends forth a plaintive melancholy cry; like birds, have but one vent for propagation, excrement, and urine; their look piteous, to move compaſſion, accompanied with tears, that diſſuade injuring ſo wretched a being; one faſtened by its feet to a pole, ſuſpended acroſs two beams, remained forty days without meat, drink, or ſleep; an amazing inſtance of ſtrength in the feet inſtanced, iii. 26 to 28.

Slot, term for the print of the hoof of the ſtag, ii. 98.

Slow, name given by ſome to the blind worm, iv. 151.

Smell, the muſky not properly a characteriſtic mark of any kind of animal, ii. 54; none more permanent than muſk, 85; ſtrong offenſive ſmell of foxes often the cauſe of their death, 215; of the genet, not endured by mice and rats, 245.

Smelling, Bramins of India have a power of ſmelling, equal to what is in other creatures; can ſmell the water they drink, to us quite inodorous; negroes of the Antilles by ſmell diſtinguiſh the footſteps of a Frenchman from thoſe of a negroe; gives often falſe intelligence; natives of different countries, or different natives of the ſame, differ widely in that ſenſe; inſtances of it; mixtures of bodies void of odour produce powerful ſmells; a ſlight cold blunts all ſmelling; ſmalleſt changes in man make great alterations in this ſenſe, i. 328, 329; delicacy of ſmelling in birds inſtanced in ducks, iii. 41. See *Senſes*.

Smile, Fielding aſſerts, a perſon with a ſteady glavering ſmile, never failed to prove himſelf a rogue, i. 281.

Snail (garden) is ſurpriſingly fitted for the life it is to live; organs of life, it poſſeſſes in common with animals; and what peculiar to itſelf; every ſnail at once male and female; and while it impregnates another, is impregnated in turn; coupling of theſe animals; poſſeſſed of the power of mending the ſhell; and come to full growth, they cannot make a new one; Swammerdam's experiment to this purpoſe; ſalt deſtroys them, ſo does ſoot; continue in a torpid ſtate during the ſeverity of winter; ſo great their multiplication in ſome years, that gardeners imagine they burſt from the earth; wet ſeaſons favourable to their production; *ſea ſnail*, *freſh water ſnail*, and *land ſnail*; common garden ſnail compared with the freſh water ſnail and ſea ſnail; freſh water ſnail brings forth youth alive, with ſhells upon their backs; at all times of the year, freſh water ſnails opened, are pregnant with eggs, or with living ſnails, or with both together; ſea ſnails found viviparous, others lay eggs; manner in which the ſea ſnails impregnate each other; different orifices or verges of ſnails, the difference between land and ſea ſnails; of the trochus kind, have no mouth; their trunk; are among ſnails, as the tiger, the eagle, or the ſhark, among beaſts, birds, and fiſhes; food of all ſea ſnails lies at the bottom; of ſea ſnails, that moſt frequently ſwimming upon the ſurface, whoſe ſhell is thinneſt, and moſt eaſily pierced, is the nautilus; its deſcription; peculiarity by which the nautilus is moſt diſtinguiſhed, iv. 43 to 53.

Snail, (ſea) a cartilaginous fiſh, deſcribed, iii. 390.

Snake. See *Serpents*.

Snake, (black) its deſcription and food; are oviparous, iv. 150.

Snipe, a water-bird of paſſage; its deſcription, iii. 253 to 255.

Snow, inhabitants of places where fields are continually white with ſnow, generally become blind before the uſual courſe of nature, i. 17.

Snow-ſlips, a family in Germany lived for a fortnight beneath one, i. 96.

Sobbing is a ſigh ſtill more invigorated, i. 280.

Soland gooſe, iii. 278. See *Baſs* and *Gannet*.

Soldier-crab, iv. 17. See *Crab*.

Solfatara, a valley near Naples; exhibits the appearance of an earthquake, i. 75.

Sonorous bodies. See *Vibrations*.

Soot, as well as ſalt, will deſtroy ſnails, iv. 46.

Sore, name the hunters give the buck the fourth year, ii. 106.

Sorel, the hunters' name for the buck the third year, ii. 106.

Sound conveyed by air is loſt in vacuo, i. 193; ſounding bodies of two kinds, unelaſtic returning a ſingle ſound, and elaſtic rendering a ſucceſſion of ſounds; laws of the reflection of ſound not ſo well underſtood as thoſe of light; perſons of a bad ear oft deceived as to the ſide whence ſound comes; trumpets made to increaſe ſounds, 324, 325.

Source, rivers have their ſource in mountains, or elevated lakes, i. 118.

Southminſter marſhes over-run with an army of mice, iii. 113.

Spalanzani, his experiments concerning reproduction in animals, iv. 313.

Spaniards, the only people of Europe acquainted with the value of the aſs, ii. 29.

Spaniels, land and water, the offspring of the beagle, tranſported into Spain or Barbary, ſo altered, and converted there; a dog of the generous kind; the land ſpaniel; the water-ſpaniel, ii. 191 to 193.

Spaniſh flies. See *Cantharides.*

Sparrows, houſe-ſparrow; various birds of the ſparrow kind; their food; ſongſters of this claſs; their migrations, iii. 196 to 198.

Sparrow-hawk, one of the baſer race of hawks, iii. 98.

Sparus, the ſea-bream, its deſcription, iii. 400.

Spawn, different ſeaſons for fiſh to depoſit their ſpawn, iii. 334.

Spawning, peculiar preparation of the lamprey for ſpawning, iii. 382.

Spears (burning) a peculiar kind of aurora borealis, i. 224.

Spears, the horns of the ſtag the third year, ii. 98.

Spermaceti, the whole oil of the cachalot eaſily converted into that concrete; efficacy of ſpermaceti in medicine very ſmall, iii. 355.

Spermaceti whale, the cachelot deſcribed, iii. 353.

Spiders, in South America and Africa, as large as ſparrows, i. 234; the ſpider for ſeveral months together, ſubſiſts upon a ſingle meal, 298; chief of our native ſpiders; not venomous; Martinico ſpider's body as large as a hen's egg; manner of making their webs; Liſter has diſtinguiſhed the ſexes of this animal; experiment made by Mr. Reaumur to turn their labours to the advantage of man; gloves made from their webs; found it impracticable to rear them, iv. 163 to 171.

Spiders, (water) inhabit the bottom, yet never wet, but incloſed in a bubble of air ſurrounding them on all ſides, iv. 171.

Spinal marrow and the brain, the parts firſt ſeen begun in the embryo, i. 309.

Spinous claſs of fiſhes already extended to four hundred ſorts, iii. 395; Gouan's ſyſtem and arrangement of the various ſorts of ſpinous fiſhes, 398; their general leading marks and difference from others, 405.

Spirits of wine flame with a candle not with a ſpark, i. 53.

Spitzbergen, bodies never corrupt there, tho' buried for 30 years, i. 379.

Sponges, opinion of count Marſigli and others about them, iv. 324.

Spoonbill, deſcriptions of the European and American ſpoonbill, iii. 244.

Sports, one peculiar to the Italians, in which horſes without riders run againſt each other, ii. 12; remarkable on horſeback, among the grandees of Guinea, 17; of wild aſſes exhibited in Perſia, 25; of the bird-catchers counterfeiting the cry of the owl, iii. 112; of hunting the turkey in Canada, 128. See *Cock*, iii. 120.

Spouts of water at Sea common in the tropical ſeas, and ſometimes in our own; deſcription of one in the Mediterranean by Tournefort; ſolutions offered for this phænomenon; thoſe called typhons, ſometimes ſeen at land, differ from thoſe at ſea deſcribed by mariners; deſcription of that obſerved at Hatfield in Yorkſhire, in 1687; land-ſpouts ſometimes drop in a column of water at once upon the earth, and produce an inundation; they appear in the calmeſt weather at ſea; facts ſtill wanting to form a rational theory of them, i. 224 to 227.

Spout-holes in the cetaceous tribe, deſcribed, iii. 337.

Springs of water, experience alone can determine the uſeful or noxious qualities of every ſpring, i. 102; one mentioned by Derham, which he never perceived to diminiſh in the greateſt drought, 117.

Squaſh. See *Polecat.* See *Stinkard*, ii. 243.

Squinting, inſtances of ſquinting communicated by a father to his offspring, i. 360.

Squirrel, a ruminating animal, ii. 39; claſſed as ſuch by Pyerius, 255; the kind has as many varieties as any wild animal; enumeration of ſome; its way of moving is by bounds; few animals ſo tender, or ſo unfit for a change of abode; ſome live on the tops of trees, others feed on vegetables below, where alſo they take ſhelter in ſtorms; deſcription of its qualities, food, and manſion; the martin deſtroys the ſquirrel, then takes poſſeſſion of its manſion, 267 to 270.

Squirrels, Nature particular in the formation of theſe animals for propagation; in Lapland vaſt numbers remove from one part to another; method of croſſing broad rivers, or extenſive lakes; the Laplanders eat their fleſh; deſcription of the *common ſort*, and of the *grey Virginian* kind; the *Barbary*; *Siberian white*; *Carolina black*; *Braſilian*; *little ground Carolina*, and *New Spain ſquirrel*; *flying ſquirrel* more common in America than Europe; its food and manſion, ii. 270 to 273.

Stag, firſt in rank among quadrupeds; its elegant form deſcribed; no obvious difference between the internal ſtructure of the ſtag and the bull, but to a nice obſerver; ruminates not ſo eaſily as the cow or ſheep, reaſon why; manner of knowing its age; differs in ſize and horns from a fallow-deer; ſeldom drinks in winter, and leſs in ſpring; different colours of ſtags; of animals, natives of this climate, none ſuch a beautiful eye as the ſtag; horns increaſe in thickneſs and height from the ſecond year of age to the eighth; grow differently in ſtags from ſheep and cows; ſtag caſtrated when its horns are off, they never grow again, the ſame operation performed when they are on, they never fall off; one teſticle only tied up, he loſes the horn of the oppoſite ſide; horns reſembled to a vegetable vegetable ſubſtance, grafted upon the head of the ſtag; time of feeling impreſſions of rut, or deſire of copulation; effects the rut cauſes; ſtag lives about forty years; voice in the time of rut terrible; and then keeps dogs off intrepidly; a ſtag and tiger incloſed in the ſame area, the ſtag's defence ſo bold, the tiger was obliged to fly; the ſtag in rut ventures out to ſea from one iſland to another, and ſwims beſt when fatteſt, ii. 87 to 94; the hind, or female, uſes all her arts to conceal her young from him, the moſt dangerous of her purſuers; ſtag remaining wild in England, called red-deer, found on moors bordering on Cornwall and Devonſhire; different names given them according to their ages; terms uſed by hunters purſuing the ſtag; the manner of knowing the track of a ſtag; and that of a hind; he changes his manner of feeding every month; in what manner; ſwims againſt the ſtream; the ancient manner of purſuing him; that of hunting him; and in China; ſtag of Corſica; a kind called by the ancients *tregelaphus*; Germans call it *bran-deer*, or *brown-deer*; a beautiful ſtag, thought a native of Sardinia, though perhaps of Africa or the Eaſt Indies; its deſcription; ſtag royal in Mexico; of Canada, brought into the ſtate of domeſtic tameneſs, as our ſheep, goats, and black cattle, 95 to 104.

Staggard, name of the ſtag the fourth year, ii. 98.

Stallions, law prohibiting exportation of ſtallions and mares, ii. 20.

Staniſlaus, the exiled king of Poland, had a dwarf at his court, i. 368.

Stare, bird claſſed with the thruſh, diſtinction from the reſt of its tribe, iii. 201.

Star-fiſh, general deſcription of the tribe; are alſo called ſea-nettles; cut in pieces, every part ſurvives the operation, becoming a perfect animal, endued with its natural rapacity, iv. 314, 315.

Starling, ſlender-billed bird of the ſparrow-kind, living upon inſects, iii. 196.

Stars (fixed) ſuppoſed by philoſophers ſuns, i. 11.

Stars (falling) meteors or unctuous ſubſtances raiſed from the earth, i. 223.

Statues of antiquity, firſt copied after human form, now models of it, i. 288.

Stature, middle in men from five feet five to five feet eight inches, i. 289; Mr. Derham obſerves, probably the ſame now as at the beginning, 374.

Stellaris, name given by the Latins to the bittern, iii. 244.

Steno, his opinion about the formation of the incipient animal, i. 239.

Stigmata, holes through which caterpillars breathe, iv. 231.

Stickleback, the gaſteroſteous of the prickly-finned thoracic ſort, deſcription of this fiſh, iii. 401; this fiſh appears in great quantities every ſeven or eight years in the river Welland, near Spalding; a man employed by a farmer to take them, for manuring his grounds, got for a conſiderable time, four ſhillings a-day, ſelling them at a halfpenny a buſhel, 414.

Stillicon, his two daughters; buried with much finery, found eleven hundred years after in good preſervation, excepting the pearls, iv. 63.

Stinkard, name given by our ſailors to one or two animals of the weaſel kind, chiefly found in America, ii. 243; and by the ſavages of Canada to the muſk-rat, 297.

Stint, ſmaller and ſhorter-billed water-bird of the crane-kind, iii. 253.

Stoat, the ermine, its deſcription, ii. 228.

Stomach, Nature has contracted the ſtomach of animals of the foreſt, ſuitable to their precarious way of living, i. 298; proportioned to the quality of the animal's food, or the eaſe of obtaining it; thoſe who chew the cud have four ſtomach; yet ſeveral of thoſe have but two in Africa, 402; the camel has a fifth ſtomach, as a reſervoir of water for occaſional uſe, iii. 8; birds have, properly, but one ſtomach, yet this is different in different kinds, 42.

Stork, a ruminating bird, ii. 39; true difference between it and the crane; are birds of paſſage; returning into Europe in March; the Dutch attentive to the preſervation of the ſtork in their republic, the bird protected by the laws, and the prejudices of the people; countries where found; ancient Egyptian's regard for this bird carried to adoration; the ancient ibis ſuppoſed the ſame which at preſent bears the ſame name, iii. 231 to 233.

Storms, foretold by the barometer; above their region all is calm and ſerene; riſe to the tops of the higheſt mountains; confirmed by thoſe who have been on the Andes, and by the deep ſnows that crown them; with powerful effects, do not ſhew great ſpeed, 203 to 205; one moſt dreadful in Hertfordſhire, in 1697; deſcription of it, 215; do not terrify goats, ii. 66.

Stones, ſhower of ſtones; raiſed by ſtorms in one country, carried to another, i. 224.

Stone of the ſhammy. See *Shammy*.

Stone chatter, ſlender-billed bird of the ſparrow kind, iii. 196; migrates, 198.

Stove, expeditious in bringing the animal in the egg to perfection, i. 245.

Strabiſm, an inequality of ſight, and particular caſt of the eye; whence it proceeds, i. 316.

Stream of rivers, more rapid in proportion as its channel is diminiſhed, and why, i. 120.

Strength, a juſt way of eſtimating human ſtrength, by perſeverance and agility of motions; not hereditary; prodigies of it Maximin the Emperor deſcribed; inſtances of it in Milo, and alſo in Athanatus; eſtimation of ſtrength in animals by the bulk of their muſcles very fallacious; thin and raw-boned men being generally ſtronger and more powerful than thoſe ſeemingly more muſcular; women much inferior in ſtrength to men; of man leſs valuable ſince the invention of gunpowder, of new machines, and the application of the power of animals to the purpoſes of life; the comparative ſtrength of a horſe, meaſured, not by what he can carry, but by what he can draw, i. 292 to 296; of the inhabitants round the poles is amazing, 348.

Stromateus, a ſoft-finned apodal fiſh, deſcribed, iii. 402.

Struthophagi, nations ſo called from their fondneſs for the fleſh of the oſtrich, iii. 67.

Stuffs, made of hair of animals about Angora, ii. 68.

Stunts, name given to whales at the age of two years, iii. 344.

Sturgeon, a cartilaginous fiſh, of a conſiderable ſize, yet flies terrified from the ſmalleſt fiſhes; its deſcription; three kinds of it; the largeſt caught in Great Britain taken in the Eſke, where frequently found weighing four hundred and fifty pounds; live in ſociety among themſelves; and Geſner has ſeen them ſhoal together at the notes of a trumpet; in the water it is one of the ſtrongeſt fiſhes, and often breaks the nets that encloſe it, but its head once raiſed above water, its activity ceaſes; two methods of preparing it; that from America not ſo good as from the north of Europe; caviar made with the roe of all kinds of ſturgeon; manner of making it, iii. 283 to 387.

Sucking-fiſh, the remora, ſticks to the ſhark; called the ſhark's pilot, iii. 368.

Sucking-fiſh, the echeneis, a ſoft-finned thoracic fiſh, its deſcription, iii. 403.

Suction, from whence that amazing power in the lamprey ariſes, iii. 381.

Sugar, the white ſort in the tropical climates ſometimes full of maggots, i. 182.

Sulphur, with iron filings kneaded together into a paſte, with water when heating, produces a flame, i. 50.

Sun, mock ſuns and other meteors ſeen in the Alps, i. 87; in the polar regions, 216; reflected upon oppoſite clouds, appear like three or four real ſuns in the firmament; real ſun always readily known by ſuperior brightneſs; the rainbow alſo different in thoſe countries, 222; not eaſy to conceive how it whitens wax and linen, and darkens the human complexion, 358;

Sun-fiſh, an anomalous cartilaginous fiſh, like a bulky head, iii. 389.

Surf of the ſea, name the mariners give waves, breaking againſt the ſhore, i. 159.

Surinam rat, the phalanger, a ſmall monkey deſcribed, ii. 387.

Surinam toad, the pipal, a hideous toad, its deſcription, iv. 89.

Surmalot, with Mr. Buffon, the great rat, a hateful rapacious creature, ii. 289.

Surmulet, the mullus, a ſpinous fiſh, its deſcription, iii. 400.

Swallows, time of their migrations; departure of ſome, and retreat of others into old walls, from the inclemencies of winter, wrap the migrations of birds in great obſcurity, iii. 54; experiment of Mr. Buffon to this purpoſe, 55; with us birds of paſſage; breed in upper Egypt and the land of Java, and never diſappear, 198; *houſe-ſwallow*; characteriſtics of the ſwallow tribe; at the end of September they depart; thoſe migrating firſt ſeen in Africa, in the beginning of October, having performed their journey in ſeven days; ſometimes ſeen, interrupted by contrary winds, wavering in their courſe at ſea, and lighting upon the ſhips in their paſſage; a doubt whether all ſwallows thus migrate, or ſome other of this ſpecies externally alike, and internally different, be differently affected by the approach of winter; obſervations made to this purpoſe by Reaumur, Friſch, and Klein; Chineſe pluck them from rocks, and ſend great numbers into the Eaſt-Indies for ſale; gluttons eſteem them great delicacies diſſolved in chicken or mutton broth; the number of their eggs, 213 to 217.

Swallows of Ternate, or *God's birds*, the bird of paradiſe, deſcribed, iii. 169.

Swammerdam, lent attention to teſtaceous animals, almoſt exceeding credibility, iv. 42.

Swan, a ſtately web-footed water-fowl; doubt whether the tame kind be in a ſtate of nature; none found in Europe; the wild ſwan, though ſtrongly reſembling it in colour and form, yet another bird; differences between wild and tame ſwans; the tame moſt ſilent, the wild has a loud and diſagreeable note; from thence called the hooper; accounts ſufficient to ſuſpend an opinion of its muſical abilities; two months hatching, and a year growing to proper ſize; longeſt in the ſhell of any bird; ſaid to live three hundred years; by an act of Edward IV. the ſon of the king was allowed to keep a ſwan, and no others, unleſs poſſeſſed of five marks a year; puniſhment for taking their eggs, impriſonment for a year and a day, and a fine at the king's will; places which abound with them, iii. 299 to 303.

Swarms, (bee-hive) ſeveral ſwarms in the year, the firſt always the beſt, iv. 269.

Sweden, aſſes a ſort of rarity in Sweden, ii. 29.

Sweetmeats, in tropical climates, expoſed by day in the ſun, to prevent their putrifying by the night-air, i. 182.

Swift, a bird of the ſwallow-kind; peculiar poſition of the toes, iii. 214.

Swiftneſs of ſavages, many ſurpriſing ſtories about it, i. 292.

Sword-fiſh, encounters the whale, 346; its deſcription, iii. 399.

Syaguſhes, carnivorous animals, like the jackall and wolf, hunt in packs, i. 405

Symmetry, and proportion of the human body, i. 273.

Sympathetic, affection of yawning; a ridiculous inſtance of it practiſed upon profeſſor M'Laurin, at Edinburgh, i. 280.

Synovia, a lubricating liquor in the joints, ſo called by anatomiſts, i. 290.

Syria, moſt of its cities deſtroyed in 1182, by an earthquake, i. 68.

Syſtem, in what manner the harmony of our planetary ſyſtem is preſerved, i. 11; very uſeful in natural hiſtory; books containing them, uſeful to be conſulted, but unneceſſary to be read; that of Linnæus deſerves the preference; faults of ſyſtematic writers in natural hiſtory, 387 to 389; what has given birth to the variety of ſyſtems in natural hiſtory, 393. See *Gouan*, iii. 398.

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Tabbies, ſtreaked cats, to which the civet's colour is compared, i. 246.

Tajacu. See *Peccary*, ii. 137.

Tails of ſheep a foot broad, and weighing from twenty to thirty pounds; ſometimes ſupported by a board upon wheels, ii. 62.

Talapoin, eight diviſion of monkeys of the ancient continent, ii. 380.

Talons, in what manner produced in animals, i. 285.

Tamaim, a monkey of the ſecond ſort of the ſagoin kind; deſcription, ii. 381.

Tamandua, an ant-bear, larger and ſmaller, lives upon ants, iii. 23.

Tamis-bird, one of the names of the Guinea hen, deſcribed, iii. 135.

Tanais, a principal river of Europe, parting it from Aſia, i. 123.

Tanrec, of the hedge-hog kind, different enough to conſtitute another ſpecies; covered with prickles, though mixed with hair; only found in the Eaſt-Indies; Indians conſider its fleſh a delicacy, ii. 311.

Tapeti, the Braſilian rabbit. See *Rabbit*.

Tapir, the largeſt animal of America, not comparable to the elephant in ſize; of Africa, i. 410; conſidered as the hippopotamos of the new continent, iii. 20.

Tar, uſed by the Laplanders for all diſorders of the rein-deer, ii. 128.

Tarantula, the bite of this animal, and its cure by muſic, all a deception; inſtance of it, i. 323; native of Apulia in Italy; deſcription, iv. 172.

Tarcel, name falconers give the male bird of prey; and why, iii. 80.

Tariguagua, ruggedneſs of road from it up to the Andes, i. 89.

Tarnaſſar, great bird in the Eaſt Indies, no other than the condor, iii. 90.

Tarſier, a monkey, laſt of the claſs of the oppoſſum kinds, ii. 387.

Tartars, their religion conſiſts in part by managing their whiſkers; they waged a bloody war with the Perſians as infidels, not giving their whiſkers the orthodox cut, i. 282; Samoid, firſt diſtinct race of men round the pole, deſcribed, 346; the Oſtiac, a race travelled down from the north, and originally ſprung from minute ſavages, 349.

Tartary, comprehends great part of Aſia; natives and manners, i. 349.

Taſte, in all ſubſtances on mountain tops, and valley bottoms, i. 194; to determine ſomewhat upon the nature of taſtes, bodies to be taſted muſt be moiſtened, or diſſolved by ſaliva, to produce a ſenſation, the tongue and body to be taſted, being dry, no taſte enſues; reliſh of taſtes ſtronger in children than in perſons advanced in life, 330.

Tatou, or armadilla, a quadruped; covered with ſhells, ii. 320;

Tatu-apara, firſt of the kinds of the armadilla; the ſecond, the tatou of Ray, or the encoubert of Mr. Buffon; the third, the tatuette; their diverſities deſcribed, ii. 325, 326.

Teal, ſmalleſt bird of the duck-kind diſtinguiſhed, iii. 308.

Teats, great variety of them in animals; their form, and how placed, i. 286.

Teeth in cows, eight cutting teeth in their lower jaw, ii. 42.

Tegg, what the hunters call the doe the ſecond year, ii. 106.

Tejuguacu, tockey, and cordyle, all of the lizard kind, gradually leſs, fill up the chaſm between the crocodile and the African iguana, iv. 112.

Tempeſts, loudeſt formed by united contributions of minerals, vegetables, and animals, increaſing the ſtreams of air fleeting round the globe, i. 195;

frequent under the tropics, and a ſpace beyond them, 205; in Arabia and Africa deſcribed, 209.

Teeth, coloured, the paſſion for them in China and Japan; in ſome parts of India black teeth deſired with ardour, i. 272; teeth of animals various; how formed in man, 285; of the elephant, ſhed like horns of deer, or obtained after death, not yet known; natives of Africa find them in their foreſts; of the narwhale ſurpaſſes ivory; aſcribed to a different animal; curioſity, and the deſire of ſcarce things, made them very valuable a century ago, iii. 351; the white ſhark is ſaid to have one hundred and forty-four teeth, 364.

Teneriff (the peak of) a mile and a half perpendicular from the ſea, i. 92.

Tendrack, an animal leſs than a mole, different from the hedge-hog, and a different ſpecies; deſcription; grunt like hogs, and love to be near water, ii. 371.

Ternate, a Molucca iſland, its ſwallow taken for the bird of Paradiſe, iii. 169.

Terrier, firſt diviſion of dogs of the generous kind, uſed for hunting, ii. 192.

Teſtaceous, ſubſtances on the tops of mountains, and in the heart of marble, i. 18.

Thales the philoſopher, held all things made of water, i. 99.

Thames water, and that of the Indus, moſt light and wholeſome, i. 101.

Theories of the earth, thoſe of the moſt celebrated authors, i. 20.

Theory of evaporation, for the formation of clouds, i. 211, 212; other theories upon that ſubject; theory of ſympathy, of Father Mallebranche, beautiful upon monſtrous productions, 364.

Theraſia, an iſland appeared unexpectedly to mariners, i. 77.

Thermometer, meaſures heat and cold by a fixed ſtandard; deſcription, i. 105. See *Blood*, ii. 278..

Theutys, a prickly-finned abdominal fiſh; deſcription of it, iii. 401.

Thibet, the muſk from thence reckoned the beſt; ſells at 14s. the ounce, ii. 87; the peacock there the moſt beautiful of the feathered creation, iii. 127.

Thoracic fiſh, that which has the ventral fins directly under the pectoral fins, iii. 398.

Throat, of the great Greenland whale is ſo narrow, that any animal larger than a herring could not enter, iii. 345; but that of the cachalot can with great eaſe ſwallow an ox, 353; that of the ſhark moſt amazing, 364.

Thruſh, a ſlender billed bird of the ſparrow kind, iii. 196; its ſong, 200.

Thumb-footed ſhell-fiſh, teſtaceous, deſcribed, iv. 67.

Thunder, Ulloa heard it rolling beneath him, when upon the Andes i. 91; its cloud always moves againſt the wind, 203; a ſound produced by the oppoſition of two clouds, and continued by reverberated echo, 215.

Thyroid cartilage forms a lump upon the wind-pipe in men, not ſeen in women, i. 285.

Tides, with Pliny, were influenced partly by the ſun, and in a greater degree by the moon; Kepler firſt conjectured attraction the principal cauſe of them; the preciſe manner diſcovered by Newton; high tides happen at the ſame time, on oppoſite ſides of the globe, where waters are fartheſt from the moon; ſolar and lunar tides; greateſt in ſyzigies, leaſt in quadratures; flows ſtrongeſt in narroweſt places; Mediterranean, Baltic, and Black Sea, no ſenſible tides, the gulph of Venice excepted; and why, higher in the torrid zone, than in the reſt of the ocean; greateſt at the river Indus, riſing thirty feet; remarkably high on the coaſts of Malay, in the ſtraits of Sunda, the Red Sea, the gulf of St. Lawrence; along the coaſt of China and Japan, at Panama, and in the gulph of Bengal; thoſe at Tonquin moſt remarkable in the world; one tide and one ebb, in twenty-four hours; twice in each month no tide at all; in the ſtraits of Magellen it riſes twenty feet, flows ſix hours, and the ebb laſts but two hours, i. 146 to 151.

Tiger, leaps twenty feet at a ſpring, i. 405; defeated by a ſtag, ii. 94; taught to defend herds, 145; attacks the lion, 160; often bigger than the lion; nothing tames it; perfectly reſembles the cat; three ſorts in Sundah Rajah's dominions; the royal tiger; carries a buffalo over its ſhoulder to its den; ſaid to follow the rhinoceros for its excrements; other tales about it; under

Auguſtus, a tiger an extraordinary ſight; the ſpecies ſcarce; opinion of Varo, that it was never taken alive; the ancients commended it for beauty among quadrupeds, equal to that of the peacock among birds; ſuppoſed to bring forth four or five young at a time; expreſſes his reſentment as the lion; the ſkin eſteemed in the eaſt, particularly in China; battle of one tiger and three elephants at Siam deſcribed; another between a crocodile; the red tiger, Mr. Buffon's cougar; common in Guinea, Brazil, Paraguai, and other parts of South America; the fleſh ſuperior to mutton, 164 to 172; and eſteemed by the negroes as a dainty, 198.

Tiger-cat, or cat-a-mountain, a beautiful animal of its kind, ii. 176.

Tigris, a great river in Aſia, loſt under mount Taurus, i. 131, 132.

Tingitanians and Egyptians famous for fine horſes, ii. 13.

Tipula (water) of the ſecond order of inſects; deſcription of it, iv. 220.

Tipula long legged gnat, deſcription of this inſect, iv. 303.

Titmouſe, a ſlender billed bird of the ſparrow-kind, iii. 196.

Toad, ſome bigger than ducks, i. 234; their fleſh as a delicacy on the coaſt of Guinea, ii. 198; differences between the frog and it, as to figure and conformation, iv. 72; their nature, appetites, and food; coupling; difficulty in bringing forth; curious particulars relating to this animal; one ſwallowing a bee alive, the ſtomach ſtung, and the inſect vomited up again; toads not venomous; accounts of toads taken inwardly; difficult to be killed; lives for centuries in a rock, or within an oak, without acceſs, nouriſhment, or air, and yet found alive and perfect; accounts of this; toads ſuck cancerous breaſts, and perform a cure; progreſs of this operation; the rubeth, the land toad, alone has the property of ſucking; doubtful whether they die by internal or external application of the cancerous matter; deſcription of the Surinam toad, called pipal, iv. 81 to 90.

Tococo, ſort of cry, given as a name in Canada to the flamingo, iii. 250.

Toes, uſually four in all animals of the pountry kind; in a ſpecies of cock amount to five, iii. 119.

Tone, a continuing tone produced from a non-elaſtic body, repeating blows quick and often; of a ſonorous body made to depend upon the number of vibrations, not the impelling force, is miſtaking an effect for a cauſe; half tones rejected in all countries, where muſic is in its infancy, as in China, i. 319 to 321.

Tongres, a city in the county of Liege, formerly encompaſſed by the ſea, and at preſent thirty-five leagues diſtant from it, i. 160.

Tongue, the flamingo's much celebrated, and larger than that of any bird, iii. 249; of the great Greenland whale, fills ſeveral hogſheads with blubber, 342.

Tonquin, tides there the moſt remarkable in the world, i. 150.

Tornado, a formidable tempeſt, ſo called by the Spaniards, i. 208.

Torpedo, its deſcription; by an unaccountable power, the inſtant touched, even with a ſtick, when immediately taken out of the ſea, it numbs the hand and arm, or whole body; the ſhock reſembles an electrical ſtroke; ſudden, tingling, and painful; accounts by Kempfer of numbneſs produced by it; he believes holding in the breath prevents the violence; implicit belief of efficacy would be painfully undeceived; this power not exerted upon every occaſion; trials by Reaumur to this purpoſe; opinions concerning the cauſe of this ſtrange effect; the fiſh dead, the power deſtroyed, then handled, or eaten with ſecurity; the power not extended to the degree ſome believe, reaching fiſhermen at the end of a line, or numbing fiſhes in the ſame pond; ridiculous exceſs of this numbing quality in the hiſtory of Abyſſinia, by Godignus; Lorenzini, from experiments, is convinced the power reſides in two thin muſcles of the back; ſeveral fiſhes have acquired the name of torpedo, poſſeſſed of the ſame quality; Moore's and Condamine's accounts of them, iii. 376 to 379.

Tortoiſe, ranked among cruſtaceous fiſhes, though ſuperior to them all; amphibious, according to Seba, diſtinguiſhed in two claſſes, the *land tortoiſe*, and the *ſea turtle*; differ more in habits than conformation; deſcription; principal diſtinctions; varieties are, *trunk-turtle*, *loggerhead*, *hawks-bill*, and *green-turtle*;

all generally found in warm countries, without retiring; the ſhell never changes, and growing with the body, is formed in pieces; a defence againſt dangerous attacks; the blood warm and red; how circulated; turtle larger than tortoiſe; tortoiſe; weighs from fifty to five hundred pounds; ancients ſpeak of ſome of amazing ſizes; live to 80 and 120 years; can live without limbs, head, or brain, proved by experiments of Rhedi; moves with great weight upon it; hears diſtinctly by means of an auditory conduit opening into the mouth; ſighs when ill ſituated, and ſheds tears when diſtreſſed; torpid during winter, ſleeping in ſome cave, and breathing imperceptibly; account of a land-tortoiſe caught in a canal at Amſterdam; and of a turtle in the Loire, in 1729, iv. 18 to 32; the food chiefly vegetables, though believed to eat inſects, ſnails, and bugs, 25, 46.

Toucan, a bird of the pie kind, has a bill as large as its body; of five varieties; the red beaked deſcribed; its food; has birds, men, monkeys, and ſerpents to guard againſt; ſcoops out its neſt into the hollow of ſome tree, leaves ſcarce room to go in and out, and with its great beak guards that entrance; found only in the warm parts of South America, where it is valued for its tender and nouriſhing fleſh, and the beauty of its plumage, particularly the breaſt, the ſkin of which the Indians dry, and glue to their cheeks for beauty, iii. 160 to 162.

Touch, thoſe parts of the body moſt exerciſed in touching, acquire the greateſt accuracy; the fingers, by long habit, not from a greater quantity of nerves, become maſters in the art, i. 331.

Tournefort, deſcribes a ſpout ſeen in the Mediterranean, i. 224.

Trachinus, the weaver, a prickly-finned jugular fiſh, deſcribed, iii. 399.

Trachipterus, the ſabre, a prickly-finned thoracic fiſh; its deſcription, iii. 401.

Track of a ſtag, manner of knowing it, and that of a hind, ii. 99.

Trade, of hair of animals, driven by the inhabitants of Angora, ii. 68.

Tragelaphus, name of a ſtag with the ancients, ii. 103.

Traps for horſes, uſed by the Arabians for the wild ſort, ii. 9.; for wild aſſes, uſed in the Archipelago, 24.

Treacle, food for bees during winter, when robbed of their honey, iv. 263.

Trees, *(foſſil)* in the body of ſolid rocks, and deep under the earth upon which they once grew; conjectures upon this ſubject, i. 35; found in quantities at the mouth of the river Neſs in Flanders, at the depth of fifty feet, 163; laying twenty feet deep under ground for many ages, become hard and tough, proofs of alternate overflowings and deſertions of the ſea, 165; uſually of the largeſt kinds in wild uncultivated wilderneſſes, in the ſtate of rude nature, 236; the banana and plantane, ſo immenſe, as to be inimically inhabited by monkeys, ſnakes, and birds of the moſt delightful plumage, iii. 166; age known by the number of their circles, 331.

Trembley, firſt diſcovered in the polypus the power of reproduction, iv. 313.

Trichurus, a prickly finned apodal fiſh of a ſword-like form, iii. 398.

Trigla, the gurnard, of a ſpinous kind; deſcription of this fiſh, iii. 400.

Trochus. See *Sea-ſnail.*

Troglodyte of Bontius, is the ouran-outang, or wild man of the woods, ii. 355.

Troglodytes, the mountain of that name in Arabia, has a paſſage made through it by a diſruption, as if artificial, i. 94.

Tropical ſeas, under them, and for a good ſpace beyond, tempeſts are frequent, and their effects anticipated, i. 205; are thoſe in which ſpouts are ſeen very commonly, 224; ſuppoſed by Linnæus, the native ſpot of man, and the northern climates only places of ſojourning for them; an argument ſufficient to prove the contrary, 361; the climates ſo hot, the dogs in proceſs of time loſe the delicacy of their ſcent entirely, and why, ii. 179.

Trumpets, increaſe ſounds, in the ſame manner as the teleſcope does bodies; perſons hard of hearing find the ſame advantage in the trumpet made for this purpoſe, that ſhort-ſighted perſons do from glaſſes; were they farther enlarged, they could be uſed to advantage only in a place of ſolitude and ſtillneſs, as the multitude of ſounds would produce tumult and confuſion, i. 325.

Trunks of animals, that of the elephant deſcribed, ii. 393; that of the gnat may juſtly be deemed one of Nature's maſter-pieces, iv. 304.

Trygon, the fire-flare, the enchantreſs Circe armed her ſon with a ſpear headed with the ſpine of this fiſh, iii. 375.

Tubes of glaſs, drawn as fine as a hair, ſtill preſerve their hollow within, i. 113

Tubular veſſels, diſcovered by Fallopius, and called his tubes, i. 239.

Tufted duck a variety of the kind, native of Europe, iii. 308.

Tumble-dung, a ſtrong beetle, remarkable for make and manners, iv. 296.

Tumbler, in the diviſion of Dr. Caius, a dog of the firſt claſs, or generous kind; ſuppoſed the lurcher, and deſcribed, 153.

Turbinated ſhells, are univalves, and the firſt kind of Ariſtotle's diviſion, iv. 39.

Turbits, variety of the tame pigeons, obtained by croſs breed. iii. 186.

Turbots, (and rays) extremely delicate in their choice of baits, iii. 374.

Turkey, bird of the poultry kind; its native country diſputed; arguments for the old and new continent; firſt ſeen in France in the reign of Francis I. and in England in the reign of Henry VIII.; its tenderneſs with us, when young, argues not for our climate; in the wild ſtate, hardy and numerous in the ſnowy foreſts of Canada; alſo larger and more beautiful than in the domeſtic ſtate; the ſavages weave the feathers into clokes, and faſhion them into fans and umbrellas; hunting the turkey a principal diverſion with them, its fleſh chiefly ſupporting their families; manner of hunting, iii. 127.

Turkey, in Aſia, has in different parts horſes of almoſt all races, ii. 16; lions found to diminiſh in number in this country, 154.

Turnings of rivers, more numerous as they approach the ſea, become indications through trackleſs lands; the bends increaſing, form different channels and mouths into the ſea, as the Danube, Nile, Wolga, i. 120.

Turnſpit, a dog of the mongrel kind, ii. 192.

Turnſtone, a ſmall bird of the crane kind, iii. 253.

Turtle dove, one of the ruminating birds, ii. 39. See *Pigeon*.

Turtle, prepares for laying, and depoſits her eggs in the ſand, where in twenty-ſix days they are hatched by the ſun; lay from 150 to 200 in a ſeaſon; the young from the egg, with their ſhell, ſeek their food untaught, and at the ſize of quails, run by inſtinct into the ſea, ignorant of all danger; propagated on ſhore only; comes from ſea on purpoſe in coupling ſeaſon; female is paſſive and reluctant; the male is ſlow, but graſps ſo faſt nothing can looſe the hold, iv. 30, 31.

Tuſks, thoſe of a boar ſometimes a foot long, ii. 131; of the babyroueſſa a fine ivory, ſmoother and whiter than the elephant's, but not ſo hard; of enormous ſize, 143; of caſtrated animals ſcarce appear without the lips; thoſe of a boar broken, abate his fierceneſs and venery, producing nearly the ſame effect as caſtration, 144; of the mammouth weigh four hundred pounds; thoſe of the elephant from Africa, two hundred and fifty; ſome remarkable lately found near the Ohio, and Miume, in America; Dr. Hunter thinks them of a larger animal than the elephant, 405; of the narwhale, or ſea-unicorn, a cetaceous fiſh with teeth, from nine to fourteen feet long, iii. 350.

Twins, never while infants, ſo large or ſtrong as children that come ſingly into the world, and why, i. 257.

Typhons, ſpouts ſo called ſeen at land, differ in ſeveral reſpects from thoſe at ſea, i. 226.

Tyſon, (Dr.). See *Ouran-outang*, ii. 359.

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Valerian, a plant of which cats are exceſſively fond, ii. 150.

Valle, (Pietro) his deſcription of Perſian horſes, ii. 16.

Vampyre, a foreign bat. See *Bat*, ii. 330.

Vanſire, a ſort of ferret of Madagaſcar, according to Mr. Buffon, ii. 233.

Vapour of metals in mines not ſo noxious as thoſe of ſubſtances with which ores are uſually united, ſuch as arſenic, cinnabar, &c.; fragrance of their ſmell; warnings about them, i. 51; diſengaged from water, and attenuated, aſcends into the atmoſphere, where condenſed and acquiring weight as it rolls, falls down in a ſhape ſuitable to the temperature of its elevation, 213; moſt fœtid, breathed from the jaws of the wolf, ii. 212.

Varenius, his opinion upon the formation of rivers, i. 118.

Vari, a kind of maki, laſt of the monkey kind; its deſcription, ii. 383.

Vault, go to vault, phraſe uſed by hunters when the hare enters holes like the rabbit, ii. 259.

Vegetables, vegetable earth; the bed of it, in an inhabited country, muſt be always dimiſhing, and why, i. 38; plant with a round bulbous head, which, when dried, becomes of amazing elaſticity, grows near the extremity of that region, on mountains where continual ſnow reigns, 90; like fluids and mineral ſubſtances, produce air in a copious manner, 184; totally unprotected, and expoſed to every aſſailant, 232; thoſe in a dry and ſunny ſoil, are ſtrong and vigorous, not luxuriant; and thoſe the joint product of heat and moiſture, are luxuriant and tender; different kinds appropriated to different appetites of animals, and why; birds diſtribute the ſeeds of vegetables where they fly; vegetables cover the bottom of many parts of the ſea, 233; but few noxious; that life as much promoted by human induſtry, as animal life is diminiſhed, 238; the aſs gives preference over others to the plantane, ii. 27; the ſole food of ruminating animals, 37; animals feeding on vegetables moſt inoffenſive and timorous, 255; ſome poſſeſſed of motion; what conſtitutes the difference between animal and vegetable life, difficult, if not impoſſible to anſwer, 307; not poſſeſſed of one power which animals have, the actual ability, or awkward attempt at ſelf-preſervation, 308; thoſe called marine grow to a monſtrous ſize, 316.

Vegetation, anticipated in its progreſs by bees, i. 263.

Velino, a river in Italy, has a cataract of 150 feet perpendicular in height, i. 130.

Velocity, not alone the actuating force of winds, but alſo the the degree of denſity, i. 205.

Velvet, like downy ſubſtance upon the ſkin covering the ſkull, when the horn of a deer is fallen off, ii. 86.

Velvet-duck, a variety of the common-duck, a native of the European dominions, iii. 308.

Venery, partridges immoderately addicted to it, to an unnatural degree, iii. 143.

Venom, given to the fire-flare by Pliny, Ælian, and Oppian, in a degree to affect the inanimate creation; many reaſons to doubt of it, iii. 375.

Venus. See *Noſe*, i. 271. See *Face*, i. 374.

Verges, or orifices of the ſnails, are two, one active, the other paſſive. iv. 49.

Vermin, hoſpitals erected by the Bramins in India for the maintenance of all kinds of vermin, i. 352; leſs found with aſſes, than with other animals covered with hair, ii. 29.

Vertigo, in goats, produced by immoderate cold, ii. 66.

Veſuvius, its eruptions, the moſt remarkable deſcribed by Valetta; account of another by Biſhop Berkley, i. 58, 59.

Vibrations. See *Tone*, i. 320.

Vineta, a port of Pomerania, overflowed and deſtroyed by the Baltic, i. 162.

Violet crab of the Caribbee iſlands, moſt noted for ſhape, delicacy of fleſh, and ſingularity of manners, iv. 12.

Viper, moſt vivacious of reptiles; experiment on a viper in the receiver of the air-pump, by Mr. Boyle, i. 183; kept in boxes for ſix or eight months, without any food; its progreſſive motion, iv. 128; the only animal in Great Britain, whoſe bite is feared; do not devour their young; their food; by the application of olive oil, the bite of the viper effectually cured; who firſt diſcovered this remedy; effects of the viper's bite, 141 to 143.

Viſion, its errors; objects repreſented upſide down and double; the point without ſenſation; and want of meaſure for diſtance, i. 310 to 312.

Viviparous and oviparous animals, the two claſſes for generation and production; all other modes held imaginary and erroneous, i. 242; the blenny, a ſpinous fiſh brings forth two or three hundred young at a time, alive and playing around, iii. 332.

Ukraine, the cattle there become very fat, and conſidered the largeſt of all Europe, ii. 47.

Ulloa, his deſcription of South America, of Cotopaxi, of Quito, of the Andes, and a volcano, i. 62.

Umbilical veſſels, thoſe of the placenta to the fœtus, i. 253.

Unan, one of the two kinds of the ſloth, an animal about the ſize of a badger, iii. 216.

Under-hung, expreſſion among painters, meaning a prominent under-jaw, i. 279.

Underſtanding, comparative progreſs of it; greater in infants than in children of three or four years old, i. 263.

Undulations in elaſtic bodies ſuppoſed by the ear one continued ſound, tho' in reality many, i. 319.

Unicorn of the ſea, a whale with teeth in the upper-jaw; its deſcription, iii. 350. See *Narwhale.*

Univalve ſhells, firſt diviſion by Ariſtotle, as to figure, iv. 39.

Volcano, opinions of philoſophers and ignorant men about it; three very remarkable in Europe, i. 56; Albouras moſt famous in Aſia; one in the iſland of Ternate; in the Molucca iſlands, in Japan, in Java and Sumatra, in the Cape de Verde iſlands, the peak in Teneriff, and alſo in America, 62; marine ones not very frequent, and why, 79.

Uranoſcopus, a prickly-finned apodal fiſh; deſcription of it, iii. 399.

Urchins, or echini, a multivalve ſhell-fiſh; manner of exhibiting this extraordinary animal in every light; its deſcription; ſome kinds as good eating as the lobſter, and its eggs conſidered as a great delicacy, iv. 65 to 67.

Urinary paſſages, effects of the cantharides falling principally upon them iv. 299.

Urine of animals found efficacious in ſome diſorders, ii. 74; of the lion inſupportable, 159; of camels, an ingredient in ſal ammoniac, iii. 10; of birds differ from that of other animals, 44.

Urſon or *Hudſon*, of the hedgehog kind, a native of Hudſon's bay; its deſcription; ſleeps much, and feeds upon the bark of juniper; in winter, ſnow ſerves it as drink, and in ſummer it laps water like a dog, ii. 315.

Urus and biſon in fact deſcendants of one common ſtock, and naturaliſts aſſigning them different claſſes, have ſeparated what is really united; this wild bull chiefly met with in Lithuania; deſcription of it; generally taken by pit-falls; the breed chiefly occupies the cold and temperate zones, ii. 44 to 47.

Vulture kind, vulture and dog, about Grand Cairo in Egypt, keep together in a ſociable friendly manner, and bring up their young in the ſame neſt, ii. 201; its diſtinctive marks from other kinds of carnivorous birds; the fleſh liked, and dreſſed for eating, according to Belonius, iii. 89; of Senegal, ſaid to carry off children, probably no other than the condor, 90; ſeldom attacks living animals when ſupplied with dead, 91; deſcription of the golden vulture, 92.

Vulture, bird of prey, next in rank to the eagle, leſs generous and bold, iii. 91; countries where found; unknown in England; flocks of them near Grand Cairo not permitted to be deſtroyed, as they devour all the filth and carrion there; in company with wild dogs, tear and devour together without quarreling; wonderful method of ſeparating the fleſh from the bones, and leaving the ſkin entire; ſmell carrion from afar; follow thoſe that hunt for ſkins alone, and ſo voraciouſly fill themſelves as merely to waddle, and to want diſgorging before they fly away; are little apprehenſive of danger, and allow themſelves to be approached; an eagle falling in upon their meals, keeps them at a diſtance till he be ſatiated; an ox returning home alone, lying down by the way, becomes their prey, and is devoured alive; attempt oxen grazing, deſtroys lambs, and feed much upon ſerpents, rabbits, hares, and what game they can overpower; alſo demoliſh whole broods of crocodiles; lay two eggs at a time, and produce but once a-year; make neſts in inacceſſible cliffs and remoteſt places; their fleſh lean, ſtringy, nauſeous, taſting and ſmelling of carrion; the down of their wing makes a pretty kind of fur, commonly ſold in Aſiatic markets, 92 to 95.

Vultures (King of) deſcription of this bird, iii. 95.

Walfiſchoas, whales' provender, inſects floating in cluſters on the ſurface of the ſea, and called Meduſa by Linnæus, iii. 345.

Walnut-trees, with walnuts on the ſtem, leaves, and branches in exact preſervation, found at twenty-ſix feet depth round the city of Modena in Italy, i. 164.

Wanderow, a baboon, leſs than the mandril, its deſcription, ii. 369.

Wappe, dog of the mongrel kind, in the third diviſion of Dr. Caius, ii. 192.

Warbling of birds, ſo loud and various in modulation, not eaſily to be accounted for, iii. 42.

Warine, the Braſilian guariba, largeſt of the monkey kind in America, ii. 380.

Waree, hog of the iſthmus of Darien, deſcribed by Wafer, ii. 144.

Waſps, ruminating inſects, or ſeemingly ſuch, ii. 39; their deſcription and habits; their habitation ſcarcely completed when the inhabitant dies; have two or three hundred queens in a hive; their neſt a moſt curious object; the ſocial waſps gather no honey themſelves, though fond of ſweets; fierce battles with the bees, who make up by conduct and numbers the deficiency of proweſs; their depredations; where found, other flies deſert the place; live but one ſeaſon; cannot endure winter; before new-year they wither and die, having butchered their young; in every neſt one or two females ſurvive; impregnated the preceeding ſeaſon, ſhe begins in ſpring to lay eggs; and before June produces ten thouſand young, which are nurſed and fed by her alone; ſolitary waſp, its manners; proviſions made for the young at leaving the egg; the proviſions arranged and laid in, the old one cloſes the hole and dies; the young leaving the egg are ſcarcely viſible; how the life of the young is ſpent; waſps of Europe innocent compared to thoſe of tropical climates; deſcription of thoſe of the Weſt Indies, and their habits; pains of their ſting inſupportable, more terrible than of a ſcorpion, the part ſwells, and people are ſo disfigured as ſcarce to be known, iv. 274 to 282.

Water, its parts infinitely ſmall; driven through the pores of gold; penetrating through all ſubſtances, except glaſs; enter the compoſition of all bodies, vegetable, animal, and foſſil; birds, beaſts, fiſhes, inſects, trees, and vegetables, with their parts, have growth from it, and by putrefaction become water; gives all other bodies firmneſs and durability; a phial, hermetically ſealed, kept fifty years, depoſed no ſediment, and continued tranſparent; gathered after a thunder-clap, in ſultry weather, depoſits a real ſalt; ſpring-water collected from the air; of river waters, the Indus and the Thames offer the moſt light and wholeſome; lightneſs, and not tranſparency, the teſt of purity; pureſt waters diſtilled from ſnow on tops of higheſt mountains; different kinds adapted to different conſtitutions; very tranſparent; freſh-water at ſea, putrifies twice, ſometimes thrice in a voyage; a month at ſea, ſends up a noiſome and dangerous vapour, which takes fire from a flame; elementary water not compounded; is ice kept in fuſion; dilates in bulk by cold; confirmed by experiments, i. 97 to 105; very compreſſible and elaſtic; made to reſemble air; a drop of water converted into ſteam, capable of raiſing twenty ton weight; keeps its ſurface level and even; a ſingle quart ſufficient to burſt a hogſhead, and how, 106 to 111; water of the ſea heavier and more buoyant than freſh-water, 141.

Water-ſpouts, burſt from the ſea, and join miſts immediately above them, i. 217; moſt ſurpriſing phœnomena, dreadful to mariners, and aſtoniſhing to obſervers of Nature, common in the tropical ſeas, ſometimes in our own; deſcription of thoſe ſeen by Tournefort in the Mediterranean, 224; ſolutions offered for this ſurpriſing phœnomenon, 225.

Water-wagtail, ſlender-billed bird of the ſparrow kind, i. 156.

Waves, their luminous appearance in the night, and the cauſe, i. 144.

Wax, the firſt fifteen days the bees make more wax than during the reſt of the year, iv. 269; of two kinds gathered by common bees; that produced by black bees in tropical climates only uſed for medicinal purpoſes, being too ſoft for candles, as in Europe, 270, 271.

Weaſel, a ſmall carnivorous animal; marks common to the kind; theſe differ from the cat kind in the formation and diſpoſition of claws; differ from the dog kind in a cloathing of fur rather than hair; one of the ſpecies is like all the reſt; this the ſmalleſt of the whole kind; its deſcription; untameable and untractable; hides and ſleeps three parts of the day, and ſallies forth for prey in the evening; attacks animals much above its own ſize; catches rats and mice better than cats; alſo ſmall birds; deſtroys young poultry, and ſucks the eggs; ſo nimbly runs up high walls, no place is ſecure from it; in cultivated lands, it thins the number of hurtful vermin; never cries but when ſtruck; all the kind have glands near the anus, ſecreting a ſubſtance fœtid in ſome, and a perfume in others; this moſt offenſive in ſummer, and inſufferable when irritated; one ſort in America is by ſailors called the ſtinkard; confined to a cage, is ever in uneaſy agitation; muſt have leave to hide itſelf; eats only by ſtealth, and will not touch the food until it begins to putrefy; the female makes an eaſy bed for her young, and generally brings forth from three to five at a time, and with cloſed eyes; account of a weaſel's forming her neſt, and bringing forth her young in the putrid carcaſe of a wolf; the white ermine found in Great Britain is called the white weaſel; its fur among us of no value, ii. 224 to 231; of the weaſel kind, the martin the moſt pleaſing, 236; the boldeſt and moſt uſeful of all is the ichneumon, 240. See *Stinkard*, ii. 243.

Weather, the moiſt alone prevents evaporation, i. 213.

Weathercocks, often erroneous with Derham in regard to upper regions, i. 203.

Weaver, the trachinous, a prickly-finned jugular fiſh, its deſcription, iii. 390; the ſting given by its back-fin is poiſonous, 422.

Weed, floating over great tracts of the ſea ſerve as ſuſtenance for many fiſh bearing ſimilitude with ſuch vegetables, i. 234.

Weight of the human body often found to differ from itſelf; inſtances of it; the difference often amounts to a pound, or ſometimes to a pound and a half; not eaſy to conceive whence this adventitious weight is derived; the porters of Conſtantinople carry burdens of nine hundred pounds weight; a man able to raiſe a weight of two thouſand pounds; a horſe will not carry upon its back above two or three hundred pounds; whence this ſeeming ſuperiority comes, i. 290, 291.

Well, burning at Broſely, now ſtopped, had a fire-damp in it, which would kindle with the flame of a candle, i. 55.

Welland, river near Spalding, has amazing ſhoals of ſticklebacks, iii. 414.

Wert (Sebald) a traveller, confirms the exiſtence of giants, on a coaſt of South America, towards the Straits of Magellan, i. 372.

Whale, the largeſt animal known; no preciſe anatomy of this fiſh yet given; two centuries ago, they were deſcribed two hundred and fifty feet long; Biſcayneers practiſed the whale-fiſhery near Greenland ſoon after the year 1300; ſeven different kinds, diſtinguiſhed by external figure or internal conformation; are gregarious animals, make migrations from one ocean to another, and generally reſort where they have the leaſt diſturbance; great Greenland whale, its deſcription; from ſixty to ſeventy feet long; the head one third of its bulk; its hearing is acute; breathes air at the ſurface of the water, and cannot remain under it like other fiſhes; it blows loudly through the ſpout-holes, and moſt fiercely when wounded; whalebone different from the bones of the body; the fins are from five to eight feet long; the throat is narrow, nothing larger than a herring can be ſwallowed; the tail, its only weapon of defence, is twenty-four feet broad, and ſtrikes hard blows; one ſeen by Ray marbled, with the figures 122 diſtinctly marked upon it; the blubber and other parts turn out to very good account; the fleſh palatable to ſome nations; the female and male keep much together; their fidelity exceeds that of birds; do not croſs breeds; ſhe goes with young nine months, is then fatter than at other times; produces two breaſts and teats at pleaſure; ſuckles her young a year, and how; is very tender of them; defends them fiercely when purſued; inſtance of it; dives with them, and comes up ſoon to give them breath; during the firſt year, called ſhort-heads, and then yields fifty barrels of blubber; at two years they are ſtunts, and after that ſkull-fiſh; the food of this animal an inſect called meduſa by Linnæus, and walfiſchoas by the Icelanders; purſues no other fiſh, and is inoffenſive in its element; the whale-louſe, of the ſhell-fiſh kind, ſticks to its body as to the foul bottom of a ſhip, gets under the wings, and eats through the ſkin into the fat; the ſword-fiſh affrights the whale, avoids the ſtroke of its tail, bounds upon its back, and cuts into it with the toothed edges of its bill; the killer, a cetaceous fiſh of great ſtrength, with powerful teeth, beſet the whale as dogs do a bull, tear it down; and then devour only its tongue; old manner of taking the whale; improvements hinted, iii. 339 to 350.

Whale (Spermaceti). See *Cachelot.*

Wheat and currants, ſwallowed whole, indigeſtible to man, iii. 74.

Wheat-ear, a ſhort-billed bird of the ſparrow kind, thought foreign, iii. 197.

Whin-chat a ſlender-billed bird of the ſparrow kind, iii. 196.

Whip-ſnake, a very venomous ſerpent of the Eaſt, is five feet long, and its bite kills in ſix hours time, iv. 147.

Whirlpool, the central point always loweſt, and why, i. 121; manner in which it is formed, 154; thoſe of the ocean particularly dangerous, 155.

Whirlwind, the moſt rapid formed by united contributions of minerals, vegetables, and animals, increaſing the current of air, i. 195.

Whiſkers, a man without them formerly conſidered as unfit for company in Spain; Nature denying, Art ſupplied the deficiency; a Spaniſh General borrowing money of the Venetians, pawned his whiſkers, and took care to releaſe them; part of the religion of the Tartars conſiſts in the management of their whiſkers, and they waged war with the Perſians as infidels, whoſe whiſkers had not the orthodox cut; the kings of Perſia wore them matted with gold thread, and the kings of France, of the firſt races, had them knotted and buttoned with gold, i. 282, 283.

Whiſton, his reaſoning concerning the theory of the earth; finds water enough in the tail of a comet for the univerſal deluge, i. 23.

White, the natural colour of man, all other tints proceed from greater or leſſer heat of climate; among white races of people, our own country bids faireſt for pre-eminence, 358.

White-bait, ſhoals appear near Greenwich in July, iii. 416.

White-noſe, the mouſtoc, monkey of the ancient continent, a beautiful little animal; its deſcription; a native of the Gold Goaſt, ii. 380.

White-threat, a ſlender-billed bird of the ſparrow kind, living upon inſects, iii. 196.

Widgeon, a variety of the European duck deſcribed, but beſt known by its whiſtling ſound, iii. 308.

Wild man of the woods. See *Ouran-outang,* ii. 355.

Wind, a current of air; artificial; cauſes aſſigned for the variety, activity, continual change, and uncertain duration of it; in what manner to foretel the certainty of a wind, as the return of an eclipſe; to account for variations of wind upon land, not at preſent expected; recourſe to be had to the ocean, and why; in many parts of the world the wind pays ſtated viſits; in ſome places they blow one way by day, and another by night; in others, for one half-year they go in a direction contrary to their former courſe; in ſome places the winds never change; the wind which never varies is the great univerſal wind, blowing from the eaſt to the weſt, in all extenſive oceans, where the land does not break the general current; the other winds are deviations of its current; many theories to explain the motion of the winds; that of Dr. Lyſter; theory of Carteſius; Dr. Halley's more plauſible, i. 194 to 197.

Winds (Trade) blow from the poles towards the equator; were the ſurface of the globe ſea, the winds would be conſtant, and blow in one direction; various circumſtances break its current, and drive it back againſt its general courſe, forcing it upon coaſts that face the weſt; want of a true ſyſtem of trade-winds, ſupplied by an imperfect hiſtory of them; north wind prevails during October, November, December, and January, in the Atlantic, under the temperate zone; north wind reigns during the winter in Nova Zembla, and other arctic countries; ſouth wind prevails during July in the Cape de Verd iſlands; north-weſt wind blows during September at the Cape of Good Hope; regular winds produced by various cauſes upon land; ancient Greeks firſt obſerved them; in general, wherever a ſtrong current of water, there is a wind to attend it; regular winds produced by the flux and reflux of the ſea; winds called monſoons; ſome peculiar to certain coaſts; ſouth wind conſtant upon thoſe of Chili and Peru; other winds particular to various coaſts, i. 198 to 201.

Winds at land puff by intervals, and why; not ſo at ſea; eaſt wind more conſtant than any other, and generally moſt powerful; wind blowing one way and clouds moving another, forerunners of thunder; cauſe of this ſurpriſing appearance remains a ſecret; from ſea, generally moiſter than thoſe over tracts of land; more boiſterous in ſpring and autumn than at other ſeaſons; their force does not depend upon velocity alone, but alſo upon denſity; reflected from ſides of mountains and towers, often more powerful than in direct progreſſion; raiſe ſandy deſerts in one country, to depoſit them upon ſome other; ſouth winds in ſummer, ſo hot in Egypt as almoſt to ſtop reſpiration, and produce epidemic diſorders, continuing for any length of time; deadly along the coaſts of the Perſian Gulph, and of India; aſſume a viſible form, i. 203 to 206.

Wind-pipe, in men has a lump not ſeen in women, i. 285; makes convolutions within a bird, and is called the labyrinth, this difference obtains in birds ſeemingly of the ſame ſpecies, iii. 42; ſtrange in the throat of the crane, 228; of the bittern, 242; in the wild ſwan, 301.

Wings of birds, their deſcription; baſtard wing, iii. 38; flap of a ſwan's wing breaks a man's leg; a ſimilar blow from an eagle lays a man dead inſtantly, 39; of butterflies, diſtinguiſh them from flies of other kinds; their number and beautiful colours, iv. 242.

Winter beginning round the poles, the miſty appearance of heat in ſouthern climates is their produced by cold, i. 222.

Wiſtiſti, a monkey of the ſagoin kind, remarkable for the tufts of hair upon its face, and its annulated tail, ii. 381.

Wolga, its length; abounds with water in May and June; at other times very ſhallow; the Engliſh diſappointed in a trade into Perſia through it, i. 123; receives thirty-three leſſer rivers in its courſe, 127; and has ſeventy openings into the Caſpian ſea, 80.

Wolf, wild dogs partake of the diſpoſition of the wolf; the wolf taken young is gentle only while a cub; as it grows older, diſcovers its natural appetite of rapine and cruelty, ii. 187; experiments prove neither wolf nor fox of the ſame nature with the dog, but each a diſtinct ſpecies, 198; a fierce, ſtrong, cunning carnivorous quadruped, externally and internally ſo nearly reſembling the dog, they ſeem modelled alike, yet have a perfect antipathy to each other; deſcription of the wolf; principal diſtinction from the dog is the eye, which opens ſlantingly upwards in the ſame direction with the noſe; alſo the tail is long, buſhy, hanging lank; the wolf lives about twenty years; it is not much with thoſe of his kind, yet hunts in packs with them; quarrelling, they devour each other; is watchful, and eaſily waked; ſupplied with water, lives four or five days without food; carries off a ſheep without touching the ground, and runs with it ſwifter than his purſuers; ſmells a carcaſe at a great diſtance; leaving the wood, goes out againſt the wind; particularly fond of human fleſh; follow armies, and arrive in numbers upon a field of battle; two or three wolves keep a province for a time in continual alarm; diſtinguiſhed by huntſmen into young, old, and great wolf; manner of hunting them; young dogs ſhudder at their ſight; the wolf killed, no dogs ſhow an appetite to enjoy their victory; the fleſh ſo very indifferent, no creature eats it but the kind itſelf; breathe a moſt fœtid vapour from their jaws; often die of hunger, after running mad by furious agitations; ſeaſon for coupling laſts but fifteen days; no ſtrong attachment appears between male and female; ſeek each other only once a year; couple in winter, ſeveral males then follow one female, diſpute cruelly, growl, and tear each other, and and ſometimes kill that preferred by the female; ſhe flies from all with the choſen when the reſt are aſleep; males paſs from one female to the other; time of pregnancy about three months and a half; couple like the dog, and the ſeparation hindered by the ſame cauſe; bring forth from five to ſix, or nine at a litter; the cubs brought forth with eyes cloſed; young wolves play with hares or birds brought by their dams, and end by killing them; able to engender when two years old; France, Spain, and Italy much infeſted with them; England, Ireland, and Scotland, happily free; King Edgar firſt attempted to rid this kingdom, and in what manner; Edward I. iſſued a mandate to Peter Corbet for the deſtruction of them; ſome quite black, ſome white all all over; found in Aſia, Africa, and America; in the Eaſt trained up for ſhow, taught to dance and play tricks; one thus educated ſells for four or five hundred crowns; in Lapland, the wolf never attacks a rein-deer when haltered; wolves of North America uſed in hunting; caught in pit-falls; a wolf, a friar, and a woman taken in one the ſame night, 202 to 212.

Wolf, (Golden) the Latin name for the jackal, ii. 218.

Wolf-fiſh, the anarbicas, a ſoft-finned apodal fiſh, its deſcription, iii. 402.

Womb, hiſtory of the child in the womb, i. 251; of the hare divided in two, as a double organ, one ſide of which may be filled, while the other remains empty, ii. 256; deſcription of the falſe womb of the oppoſſum, 384.

Woman, ſome continue pregnant a month beyond the uſual time; thoſe of Africa deliver themſelves, and are well a few hours after, i. 256; in barbarous countries, the laborious duties of life thrown upon the women; the chief and only aim of an Aſiatic is poſſeſſion of many women; inſtance, in our own country, of a fine woman married to an eunuch; a principal employment of thoſe of Thibet, is reddening the teeth with herbs, and making their hair white, 269 to 272; the body arrives at perfection ſooner than in men; the perſons of women as complete at twenty as thoſe of men at thirty, 273; leſs apt to become bald than men; Mr. Buffon thinks they never become bald; there are too many inſtances to the contrary, 277; lower eye-lids drawn downwards when with child; the corners of the mouth alſo; then likewiſe high-ſhouldered; circumſtances under which the midwives call them all mouth and eyes, 287; the ſhoulders narrower, and the neck proportionably longer than in men, 289; firſt impulſe of ſavage nature confirms women's ſlavery; the next of half barbarous nations, appropriates their beauty; and that of the perfectly polite engages their affections, 296; the bones, cartilages, muſcles, and other parts of the body, ſofter than in men; a woman of 60 has a better chance than a man of that age to live to 80; women longer in growing old than men, 339; in the polar regions as deformed as the men, 346; women of India deſcribed; marry and conſummate at eight, nine, or ten years old, and have children at that age; ceaſe bearing before the age of thirty; thoſe of ſavage nations in a great meaſure exempt from painful labours, 352; after a catalogue of deformities, Linnæus puts down the ſlender waiſts of women in Europe, by ſtrait lacing, deſtroying their health, through a miſtaken notion of improving their beauty, 362; remarkable inſtance of the power of imagination upon the fœtus, 363.

Woods, in Britain, cut down by the Romans, and for what reaſon, i. 166.

Woodcock, or *cock of the wood*, of the grouſe kind; places which this bird inhabits; how diſtinguiſhed from the other birds of the poultry kind; the delicacy of its fleſh; its food and habitation; amorous deſires firſt felt in ſpring; keeps to the place where he firſt courts, and continues till the trees have their leaves, and the foreſt is in bloom; its cry, clapping of wings, and ridiculous poſtures in this ſeaſon; during which the females, attending his call, are impregnated; ſportſmen uſe this time to fire at them, and take many while thus tame, though at others it is moſt timorous and watchful; the female much leſs than her mate, and ſo unlike him in plumage, ſhe might be miſtaken for another ſpecies; number and ſize of the eggs; ſhe hatches them without the cock, and when obliged to leave them in queſt of food, ſo covers them with moſs or leaves, it is difficult to find them; ſhe is then extremely tame and quiet; keeps her neſt, though attempted to be driven away; the young being hatched, they run with agility after the mother, though ſcarcely diſengaged from the ſhell; their food ant's eggs, and wild mountain berries; older, they feed upon the tops of hether, and cones of pine-trees; are hardy; the clutching time over, the young males forſake the mother, keep together till ſpring, when the firſt genial acceſs ſets them at variance for ever; fight each other like game-cocks, and eaſily fall a prey to the fowler, iii. 139 to 141.

Woodcock, bird of the crane kind, its dimenſions; food, iii. 253.

Woodchat, a rapacious bird, third kind of the butcher bird, iii. 107.

Wood-louſe, its deſcription; has three varieties, iv. 183.

Woodpecker, of this bird are many kinds and variety in each; general characteriſtics; deſcription of the *green woodpecker*, or *wood-ſpite*, called the *rain-fowl* in ſome parts; food; its tongue, the inſtrument for killing and procuring food; want that inteſtine which anatomiſts call the cæcum; in what manner they make neſts, and how delicate in the choice; number of eggs; neſts in warmer regions of Guinea and Braſil; *little woodpecker*, called by the natives of Braſil *guiratemga*, iii. 162 to 169.

Woodward, his eſſay towards a natural hiſtory; detail of it, i. 22.

Wool, the Spaniſh finer than ours; but in weight not comparable to that of Lincoln or Warwickſhire; ſome Spaniſh wool required to work up with it, ii. 60.

Worms of different kinds infeſt each ſpecies of fiſh, iii. 421; ſea-worms make the ſhells of fiſhes their food, iv. 41; within the body of the caterpillar, devour its entrails without deſtroying its life, 249.

Worm (Blind) of the ſerpent kind; lies torpid all winter, iv. 151.

Worm (Froth) an inſect in that ſort of ſubſtance on the ſurface of plants, iv. 220.

Worm kind general deſcription of the earth-worm, iv. 310.

Wraſſe, the labrus, of the prickly-finned thoracic kind, iii. 400.

Wren and *golden-crowned wren*, ſlender-billed birds of the ſparrow kind, iii. 196; *willow wren*, a wandering bird of the ſparrow kind, 198.

Wrinkles, whence thoſe of the body and face proceed, i. 338.

Wry neck, or cuckoo's attendant, a little bird moſt active in the chaſe of the young cuckoo, iii. 172.

X

Xiphias, or the ſword-fiſh, of the prickly-finned apodal kind, iii. 399.

Y

Young People ſometimes ceaſe growing at fourteen or fifteen, i. 273.

Z

Zealand, inundations there, in which many villages were and remain overflowed, i. 162.

Zebra, the moſt beautiful, but wildeſt animal; a native of the ſouthern parts of Africa; nothing exceeds the delicate regularity of its colour; deſcription; watchful and ſwift; its ſpeed a proverb among Spaniards and Portugueſe; ſtands better upon its legs than a horſe; in what countries found; the Portugueſe pretend to have tamed, and ſent four from Africa to Liſbon, to draw the king's coach; ſome ſent to Braſil could not be tamed; Merolla aſſerts, when tamed, they are ſtill as eſtimable for ſwiftneſs as beauty; their noiſe reſembles the confuſed barking of a maſtiff dog; in two, the author ſaw, the ſkin below the jaw, upon the neck, hung looſe in a kind of dewlap; they are eaſily fed; ſome in England eat bread, meat and tobacco; the emperor of Japan made a preſent of ſixty thouſand crowns value, for one received from a governor of Batavia; the Great Mogul gave two thouſand ducats for another; African ambaſſadors to the court of Conſtantinople, bring ſome with them, as preſents for the Grand Seignior; zebra and wild aſs of a very different ſpecies, ii. 31 to 36.

Zebu, the barbary cow, and the grunting or Siberian cow, are but different races of the biſon, ii. 54.

Zeiran, name of the fourth variety of gazelles, by Mr. Buffon, ii. 77.

Zembla (Nova) north wind reigns there during winter, i. 200; a deſcription of its inhabitants, 346.

Zeus, the doree, of the prickly-finned thoracic kind, deſcription of that fiſh, iii. 401.

Zibet, one of the two ſpecies of the civet, according to Mr. Buffon; diſtinction between them, ii. 245.

Zone (Temperate) properly ſpeaking the theatre of natural hiſtory, i. 16.

Zone (Torrid) in the centre the heat very tolerable, in other places the cold painful; temperature and advantages of perpetual ſpring under it, 90; lightening there not fatal or dangerous, 218; has the largeſt quadrupeds; all fond of the water, ii.

Zoophytes, name of Vegetable Nature endued with animal life, iv. 307; firſt claſs of zoophytes, 309; all the tribe continue to live in ſeparate parts; one animal by cuttings, divided into two diſtinct exiſtencies, ſometimes into a thouſand, 312; ſecond claſs, 314.

Zorille, a ſtinkard, of the weaſel kind; reſembles the ſkink; is ſmaller, and more beautifully coloured, ii. 243.

THE END.

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